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SAILING DIRECTIONS  
FOR THE  
WEST COAST OF ENGLAND  
1884



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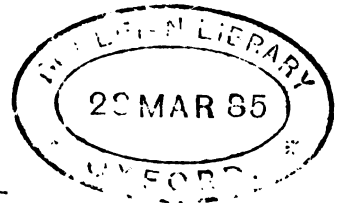
**'LAND,**

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# SAILING DIRECTIONS

FOR THE

## WEST COAST OF ENGLAND,

FROM

## MILFORD HAVEN TO THE MULL OF GALLOWAY,

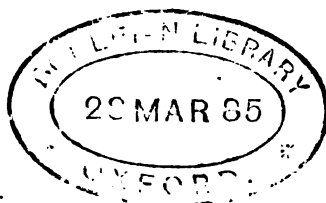
INCLUDING

## THE ISLE OF MAN.

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*THIRD EDITION.*

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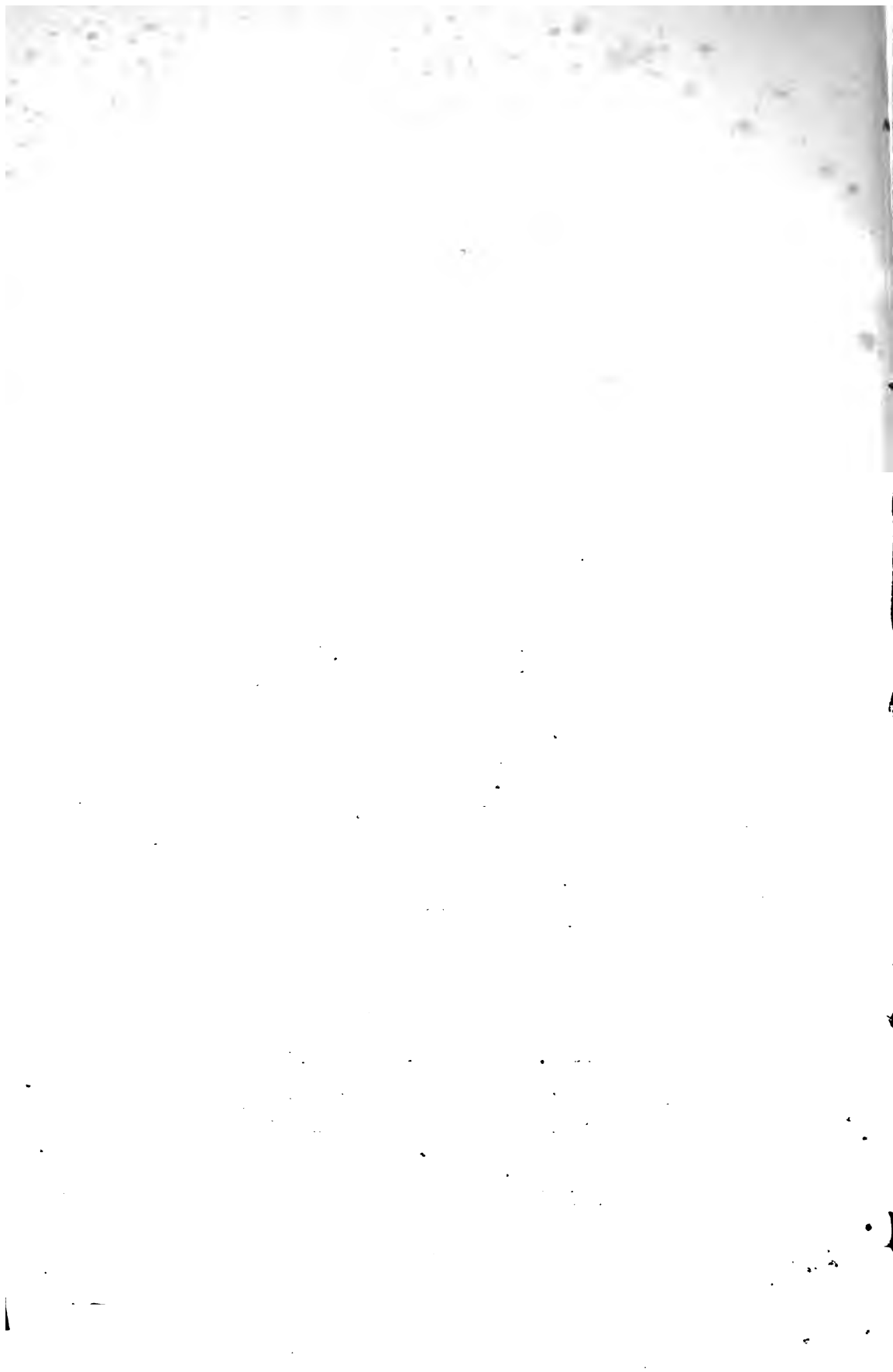
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**ADVERTISEMENT**  
TO  
**THE THIRD EDITION.**

---

THIS work includes a description of the coast, with Directions (in continuation of those for the Bristol channel) from Milford haven to the Mull of Galloway, including the Isle of Man.

The first edition, compiled by Captain E. J. Bedford, R.N., was published in 1870; and the second in 1876.

The present edition has been revised by Mr. E. C. Davison, R.N., and corrections from the latest Admiralty surveys, official notices, and information furnished by local authorities, introduced.

F. J. E.

Hydrographic Office, Admiralty, London.  
March 1884.

**IN THIS WORK THE BEARINGS ARE ALL MAGNETIC  
EXCEPT WHERE MARKED AS TRUE.**

**THE DISTANCES ARE EXPRESSED IN SEA MILES OF  
60 TO A DEGREE OF LATITUDE.**

**A CABLE'S LENGTH IS ASSUMED TO BE EQUAL TO  
100 FATHOMS.**

**THE SOUNDINGS ARE REDUCED TO LOW WATER OF  
ORDINARY SPRING TIDES.**

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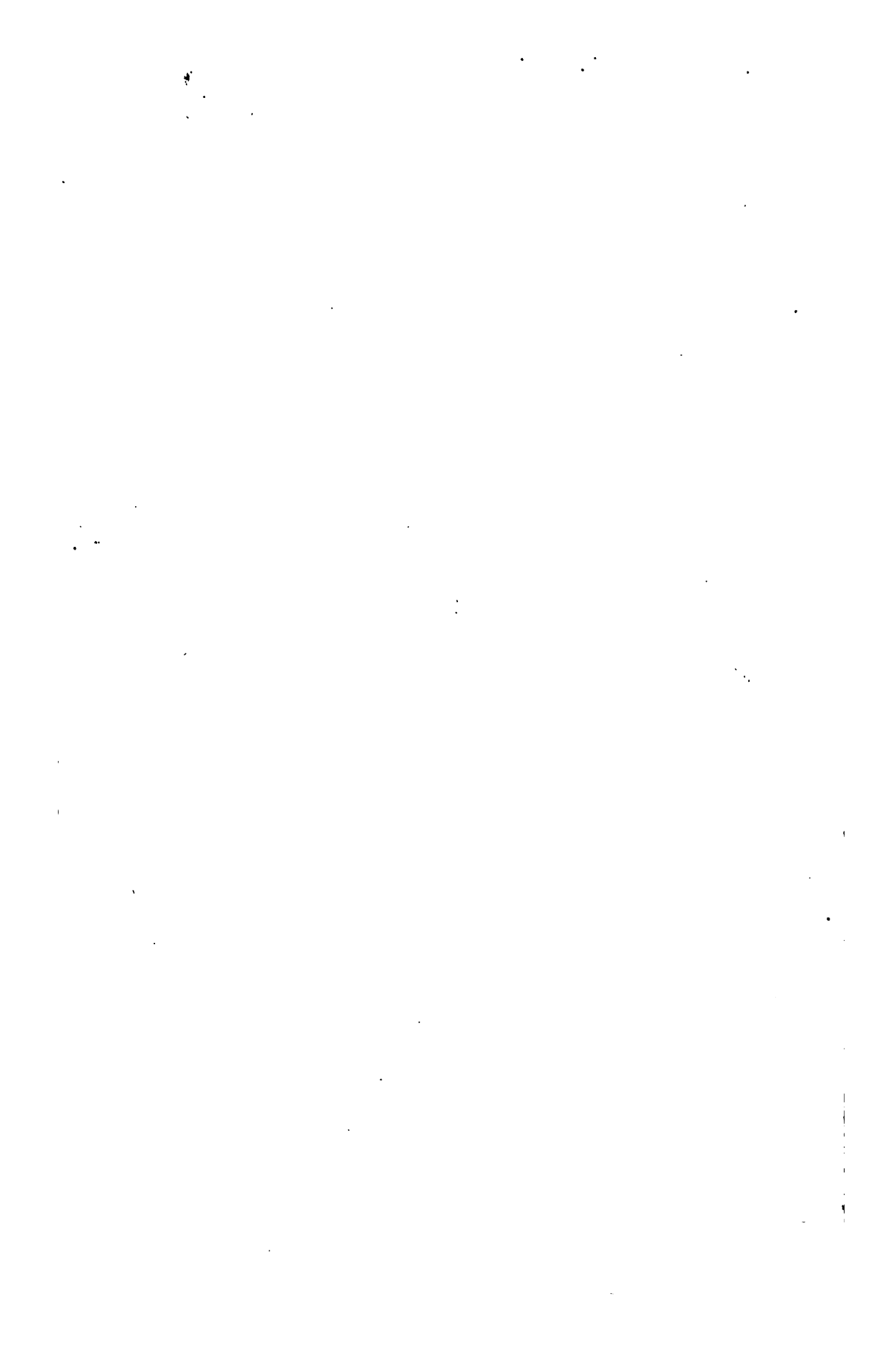
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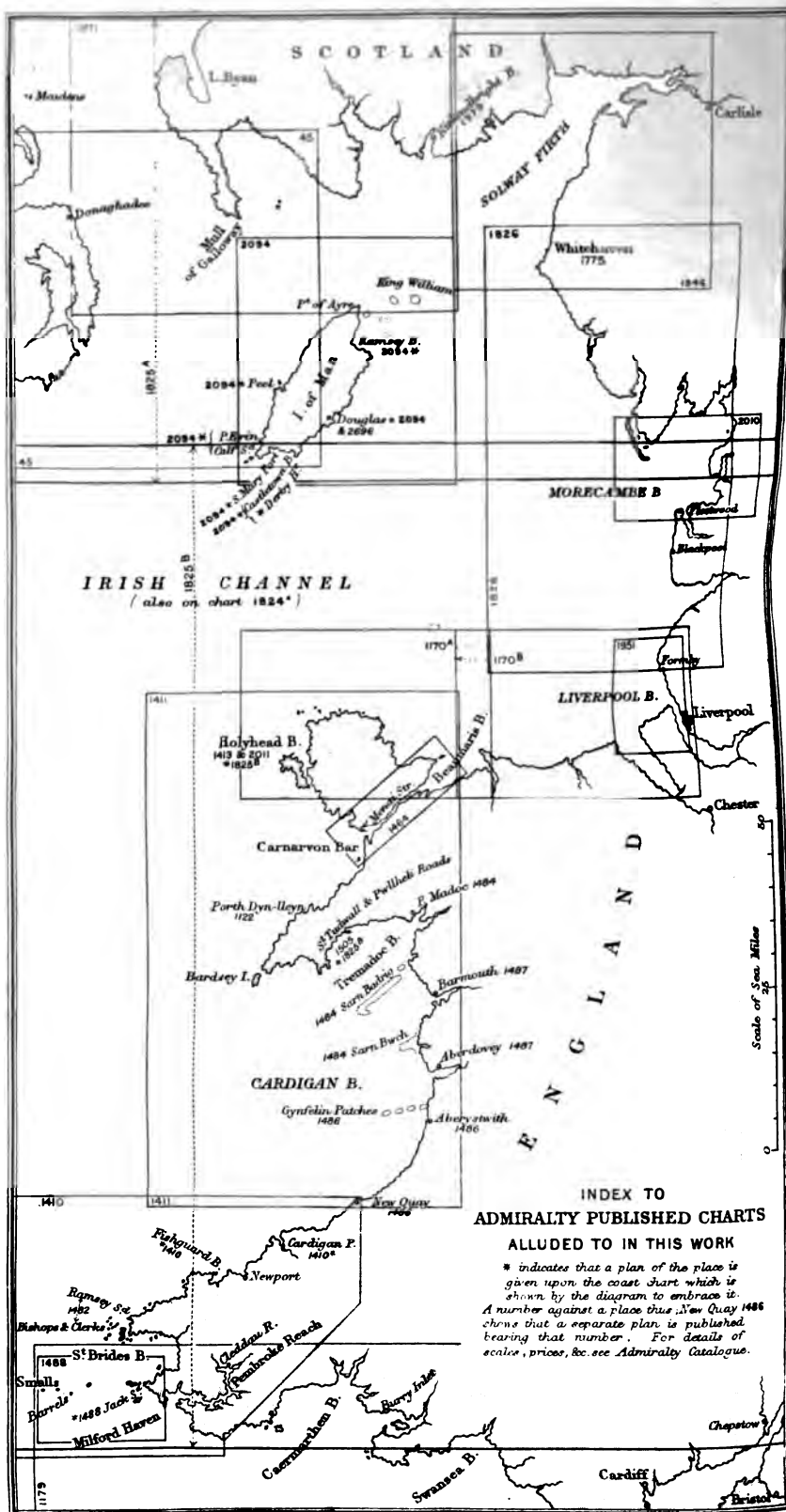
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# SAILING DIRECTIONS

FOR THE

## WEST COAST OF ENGLAND.

### CHAPTER I.

FROM BRISTOL CHANNEL TO CARDIGAN BAY.

ST. ANN HEAD TO KEMMAES HEAD.

VARIATION IN 1884.

For later information respecting the lights which are described in this work, seamen should consult the Admiralty list of lights in the British Islands. These light lists are published early in the current year, corrected to the preceding 31st December.

over it, lying

the outer extremity of Gateholm island bearing N. by W.  $\frac{3}{4}$  W.\*

Gateholm bay is skirted throughout by sands one and half cable broad at low-water, with some scattered irregular shelving rocks, and it is bounded by perpendicular dark red cliffs, which are accessible only about midway and at their south-east end. Gateholm island projects in a W. by S.  $\frac{1}{2}$  S. direction one-third of a mile from the coast cliffs; it is also bounded by shelving rocks, which connect it at low-water with the main; a detached rock dries one cable from the outer end of the island, but the depth is not less than 7 fathoms at one-quarter of a mile off, and the same water will be found at that distance off shore, the whole of the way from St. Ann head. Gateholm bay is a convenient anchorage to wait a tide at, in northerly winds, observing that 11 fathoms, sandy bottom, will be found with the outer part of Skomar island open of Gateholm island, and St. Ann head just in sight.

\* See Admiralty charts, Irish channel, 2 sheets, Nos. 1,825a and b, with plans of ports; scale,  $m=0.25$  inch; England, west coast, Bristol channel to New Quay, No. 1,410; scale,  $m=0.5$  inch; with plans of Port Cardigan and Fishguard bay: and, St. Ann head to St. Bride bay, including the Smalls, Grassholm, and the adjacent islands, with plan of Jack sound, No. 1,488; scale,  $m=1.94$  inch; Bristol channel, No. 1,179, scale,  $m=0.5$  inch.

The coast from near the inner end of Gateholm island, maintaining the same rugged character, trends in a N.W. by N. direction for about  $1\frac{1}{4}$  mile, and then N. by E.  $\frac{1}{2}$  E. to Wooltack point, where it turns sharply into St. Bride bay, and forms, with Mid isle, the narrow passage of Jack sound.

**JACK SOUND.\***—This passage, though little more than one cable in width, between the Horse, on the mainland side, and Bitches rocks off Mid isle, is a very convenient one to coasters; and it may be used even in square-rigged vessels, with a leading wind, by those acquainted with it. When a stranger is informed of the sluicing and over-falling stream with its various and sudden eddies, which sets through the sound at the rate of 5 or 6 knots, and that there is no decided mark for avoiding the bounding rocks, he will never willingly attempt it, but, from unavoidable circumstances, it may so happen that, coming from Milford with a south-westerly wind and northern stream, and intending to pass through Broad sound, he may find his vessel, after passing Gateholm island, inevitably drawn into Jack sound stream. In such a case, as anchoring is out of the question, the following directions, &c. must be carefully attended to.

**Bench Rocks.**—The first danger which presents itself in approaching Jack sound from the direction of Milford is the cluster named Bench rocks upon the mainland side, upwards of three-quarters of a mile N.N.W.  $\frac{1}{3}$  W. from the outer extremity of Gateholm island, and with their outer part rather more than one-quarter of a mile from the nearest shore. A portion of their black surfaces never covers; there is a depth of 2 fathoms in the passage within them, and 10 fathoms at one-quarter of a mile to the westward, but a rock, with only  $2\frac{1}{2}$  fathoms over it, lies S.W.  $\frac{3}{4}$  W.  $1\frac{1}{2}$  cable from their outer extremity, and in the direct track to and from the sound.

**Inner Bench Rocks**, which dry 12 feet, lie three-quarters of a cable south of Anvil point, with sunken rocks half a cable to the westward.

**Blackstones** lie one-quarter of a mile southward of Mid isle, and N.W.  $\frac{1}{3}$  W., half a mile nearly, from Bench rocks; they never cover, and are bold-to, except to the northward. East, 2 cables from Blackstones, is a small rock with  $3\frac{1}{2}$  fathoms over it, also obstructing the navigable sound track.

**Western Blackstone**, a rock which dries 7 feet, with 5 to 8 fathoms around it, lies three-quarters of a cable N.W. by W.  $\frac{1}{2}$  W. from Blackstones; and one cable N.E.  $\frac{1}{4}$  E. from Western Blackstone is a rocky patch of 2 fathoms.

**Horse Rock**, which dries 8 feet, lies out from the mainland towards Mid isle, for a full cable across the passage; and in the direction and nearly

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\* See plan of Jack sound, on Admiralty chart St. Ann head to St. Bride bay, No. 1,488.

midway from it towards Inner Bench rocks, are two other rocks, the innermost of which dries 12 feet at low-water springs.

**Bitches.**—Upon the opposite side of the sound are the Bitches, which dry 16 and 18 feet at low-water; they shelve from Mid isle towards the Horse, so as to leave a clear passage, only 260 yards wide. Some dangerous sunken rocks just outside the Bitches must be guarded against.

**Tucker Rock,** off Wooltack point, about 5 feet above high-water, and black, with a sunken rock half a cable to the southward of it, though bold-to on the outside, must be approached with caution, as a strong eddy sets round it, with a considerable overfall.

In the narrowest part of the sound a depth of 6 and 7 fathoms will be found, but the lead will fall into a depth of 21 fathoms shortly after passing the Tucker.

**TIDES.**—In Jack sound, the stream sets to the northward at two hours' flood upon the shore, and turns to the southward at two hours' ebb. The flood-stream sets directly across for Ramsey island with great strength for a short distance; the ebb sets nearly direct through the sound, but causes a dangerous eddy near the south side of Mid isle, which should be carefully avoided, if working through with southerly winds. A sloop was lost in 1838 from standing into this eddy.

**Directions.**—Should the tide be adverse, be extremely careful of the helm, for the rate of the stream is such that a broad yaw would sheer the vessel in a moment either upon Horse rock or upon the Bitches, to her certain loss.

In passing from the southward between Bench rocks and Blackstones keep as close as practicable to the latter, and having passed them, steer towards Tucker rock, carefully keeping the western extremity of Skokham island in line with the eastern part of Blackstones, bearing S.W.  $\frac{1}{4}$  W.; this leads through, but rather on the side of the Bitches, and when about midway between Mid isle and Wooltack point, the Bitches have been cleared, and the vessel may be hauled to the northward and westward.

St. Ann lights do not show in Jack sound, so that it is only during bright moonlight that even those well acquainted with the passage are warranted in attempting it at night; although the short cut and smooth water it offers, as well as a means for avoiding the heavy race off the west end of Skomar, often tempts the coasters to use it at great hazard.

**SKOKHAM ISLAND,** separated from the mainland by Broad sound, is one mile long east and west, and half a mile broad; it is bold towards the sea, and slopes and terminates to the eastward in a low neck and insulated rock named the Stack, bearing N.W.  $\frac{1}{4}$  W.,  $3\frac{1}{10}$  miles from St. Ann head, and W. by S.  $\frac{1}{4}$  S.,  $1\frac{1}{2}$  mile from the outer end of Gateholm island. The Stack has numerous outlying sunken rocks about it, which



are much in the way of vessels proceeding through Broad sound to or from Milford. About one cable N.E. by N. from the Stack is a rock awash; at 2 cables N.E.  $\frac{1}{4}$  E. is one with 2 fathoms over it; and  $2\frac{1}{2}$  cables N.E. and N.N.E.  $\frac{3}{4}$  E., from the Stack are two others with  $3\frac{1}{2}$  fathoms over them. These several rocks are based upon a projection from the island, named Skokham spit, immediately outside of which the depths are 14 and 15 fathoms. About 4 cables S.S.E.  $\frac{2}{3}$  E. from the Stack are rocks with only 3 fathoms over them. About midway along the north side of Skokham, and one cable from the shore, is a rock awash at low-water.

Skokham has a rocky and barren appearance, with steep dark-coloured cliffs; it is elevated at the western end 165 feet, and a white farmhouse towards its eastern end is visible from the direction of Jack sound and from the south-eastward. On the south-eastern side of the island there is a bight of still water, with 7 fathoms over a rocky bottom, about one cable from the shore, where vessels sometimes anchor for a tide in fine weather, but a dangerous half-tide rock obstructs the southern approach to it. In this bight, and in a nook near the Stack, are the only landing-places upon the island.

**SKOMAR ISLAND**, by its terminating the southern side of St. Bride bay, becomes a very prominent feature of the Welsh coast, both from the northward and southward. Its centre is elevated about 226 feet above the sea; it is  $1\frac{1}{2}$  mile long, in a N.W. by W.  $\frac{1}{2}$  W. and S.E. by E.  $\frac{1}{2}$  E. direction, and one mile across north and south. There is a low isthmus nearly half a mile from its eastern end, where, at one time, it seemed probable that the sea would break through and thus form another detached mass similar to Mid isle: at present, however, the isthmus forms the common head of North and South havens, each of which affords occasional anchorage and a landing-place. In entering them, it is necessary to keep the north-western shore aboard, so as to avoid some out-lying and straggling rocks upon the opposite sides, and they must be quitted the instant the wind inclines inwards. Off the south point of Skomar is the conical green-capped islet called the Mewstone, of equal height with the island, and over-hanging singularly towards it. Off the northern extremity of Skomar there is also another high conical rock, the Garland stone, close to which, as well as round the outer part of the island, there is a depth of 20 fathoms over a rocky bottom. The island is surrounded by deeply indented cliffs; is as dark-coloured and sterile as Skokham, and, like the latter, has only one house upon it, the tenant of which derives a considerable income from the sale of the rabbits which swarm upon the island.

**Mid Isle**, which is 154 feet high, is only detached from Skomar by a pass 40 or 50 fathoms wide, through which boats may run at high-water.

**BROAD SOUND**, the wide and available channel formed between Skomar and the mainland to the northward, and Skokham to the southward, has over the greater portion of it depths varying between 15 and 25 fathoms, but it is partially obstructed by the following bank and race.

**The Knoll or Denham Bank**, embraced by a 10-fathoms boundary, extends N.W.  $\frac{1}{2}$  W. and S.E.  $\frac{1}{2}$  E., and is one mile in length, and about a quarter of a mile in breadth, its south-east end being within four cables of the north part of Skokham. Its 5-fathoms sandy ridge is one-quarter of a mile long, and may be found with Linney head touching Skokham head, and Tucker rock barely clear of Mid isle; but on this ridge are several rocks with only  $3\frac{1}{2}$  and  $4\frac{1}{2}$  fathoms upon them, lying N.W.  $\frac{3}{4}$  N.,  $1\frac{1}{10}$  mile, and N.W.  $\frac{1}{2}$  N.  $1\frac{1}{2}$  mile from Skokham stack, or nearly midway between, and in the line of the west end of Skokham island and the Mewstone of Skomar island.

The sandy portion of this bank affords a convenient stopping-place on the ebb, as there is then nearly slack water upon and within it; and vessels can here hold their own in light winds, if too late upon the flood to reach Milford.

**Wildgoose Race.**—An overwhelming sea for small vessels breaks off Skokham and Skomar, with a weather-going tide and strong winds, and with a westerly wind and northerly stream, broken water, known as Wildgoose race, sweeps outwards between the western extremities of these islands. Many vessels have foundered in it, and others have been dismasted from the stress occasioned by its high cross sea.

Rocky patches with  $4\frac{1}{2}$  and 5 fathoms over them occur within the limits of this race, N.W.  $\frac{1}{2}$  W., about two-thirds of a mile from the west end of Skokham island, and S. by W.  $\frac{1}{4}$  W. from the north-west end of Skomar island.

**Soundings—Tidal Streams.**—The soundings from St. Ann head to Jack sound at half a mile off-shore are 11 and 12 fathoms over coarse ground, but they deepen to between 16 and 25 fathoms in the fairway of Broad sound. At 2 miles off Milford entrance, and one-third of a mile outside Skokham and Skomar, the depths (excepting over the rocks in Wildgoose race), are about 27 fathoms, with sand and shells off the haven, and rocky bottom off the islands. At this offing, the flood, or northerly stream, runs till four hours after high-water by the shore, and the ebb stream in an opposite direction, but inshore, they each make half an hour later. On the Knoll, the direction of the stream is constantly varying, and is much slacker in its rate than elsewhere in the sound.

**Directions.**—Vessels approaching Milford haven, or vice versa, in blowing weather, should avoid Wildgoose race by passing outside the islands at an offing of 2 miles at the least.

In passing through Broad sound in moderate weather it is prudent for large or deep ships to keep on the Skomar side of the passage, so as to avoid the rocky patches upon the Knoll. To clear them, keep the south-east end of the sand in Gateholm bay, just open of Gateholm island, S.E. by E.  $\frac{1}{2}$  E., until Skokham stack bears S. by W.  $\frac{3}{4}$  W. The general leading mark through a safe track in Broad sound is Linney farm, just open of St. Ann head, bearing S.E.  $\frac{3}{4}$  S.; keep them so till Wooltack point comes nearly in line with Gateholm island, N. by W.  $\frac{1}{4}$  W., which latter mark will lead to a proper berth off St. Ann head, either for hauling in, or for avoiding the heavy cross sea which generally breaks off it in a weather-going tide.

At night, St Ann upper light should be kept bearing S.E.  $\frac{3}{4}$  S. while passing through Broad sound; and to a vessel approaching the haven from the westward, a good berth will be maintained outside Skokham, so long as St. Ann lights are not brought to the southward of E. by S.  $\frac{3}{4}$  S.

**GRASSHOLM**, a small island W. by N.  $\frac{2}{3}$  N., a little more than 6 miles from the west end of Skomar, is about three-quarters of a mile in circumference, and its rugged shores are scarcely approachable; landing, however, may be effected at the east end. This island is, nevertheless, a conspicuous object from the sea, being frequently the first land made when approaching from the south-westward; the centre of the island, its highest point, is 146 feet above high-water.

It bears from St. Ann high lighthouse N.W.  $\frac{3}{4}$  W.,  $11\frac{3}{4}$  miles; from the Smalls lighthouse, E. by S.  $\frac{1}{2}$  S., 7 miles; from the South Bishop lighthouse, S.W.  $\frac{1}{3}$  S.,  $7\frac{2}{3}$  miles; and from the south point of Ramsey island, S.W. by W., 9 miles.

**Mersey Rock**.—Nearly half a cable from the eastern end of Grassholm is Mersey rock which dries 2 feet; and at the west end of the island are several rocks drying 13 feet.

**Grassholm Race**.—As the tide streams set directly against the island, they occasion a considerable race off both its ends, and a strong eddy or indrift on the opposite side to the tide, for the distance of upwards of a quarter of a mile from the rocks. A narrow tongue also extends in a S. by E. direction from the island for upwards of one mile, with depths of 12 to 15 fathoms, and 23 to 26 fathoms close to on either side, which causes overfalls. Some caution, therefore, should be observed in approaching the island, particularly in light winds.

**BARRELS**.—The Barrels, two heads of which dry a little after half-ebb, or at the last quarter of the tide, lie W.  $\frac{1}{3}$  N., 3 miles from the centre of Grassholm. Although their position is generally shown by a heavy breaking sea over them, they must be approached with caution when

near high-water, in light winds, and with no swell. The stream sets over them with great strength, particularly at springs, causing an eddy or indraft upon the lee side, which should be carefully guarded against. Though the rocks which dry occupy but a very small space, the foul ground in connection with them or the tails of the shoal, extend some distance out to the south-south-westward and north-north-eastward, rendering it extremely imprudent to approach them nearer than half a mile. Upon the centre of the rocks, Llaeithy hill, near St. David head, is just clear of the north part of Ramsey hill; and they bear from St. Ann high lighthouse N.W. by W.  $\frac{1}{2}$  W.,  $14\frac{1}{2}$  miles; from the Smalls lighthouse, S.E. by E.  $\frac{1}{2}$  E.,  $4\frac{1}{2}$  miles; and from the South Bishop lighthouse, S.W.  $\frac{3}{4}$  W., 10 miles.

**HATS.**—These rocks lie N.W.  $\frac{3}{4}$  W.,  $2\frac{1}{2}$  miles from the Barrels, and as they never dry, great caution is requisite while passing them. At low-water, there being but  $1\frac{1}{2}$  to 3 fathoms over the group, a weather tide produces a terrific sea, and though the shoal is not of large extent, yet the depth of water is so irregular, and the tide streams are so rapid, as to cause great overfalls, against which seamen cannot be too much on their guard. When on the shoalest part of the Hats, Llaeithy hill will be seen just within the north point of Ramsey island; and they bear from the Smalls lighthouse, E. by S.  $\frac{1}{2}$  S., 2 miles, or in a line with Grassholm; and from the South Bishop lighthouse, S.W. by W.  $\frac{3}{4}$  W., 11 miles.

**SMALLS.**—The Smalls are a cluster of low bare rocks, about half a mile in length, N.E.  $\frac{3}{4}$  E. and S.W.  $\frac{3}{4}$  W., and three cables in breadth, but they are never entirely covered.

**LIGHT.**—Upon the largest of the Smalls rocks, which is about midway along the north-west side of the group, and is 130 yards in length, a circular stone lighthouse is erected; it is coloured red and white in horizontal bands, and from the lantern, which is 125 feet above high-water, is shown a *fixed white* light, visible in clear weather from all directions at a distance of 17 miles. Between the bearings W.  $\frac{1}{2}$  N. and N.W.  $\frac{3}{4}$  W., or covering the Hats and Barrels, the light is *red*.

**Fog Signals.**—In thick or foggy weather a bell is sounded; and, in addition, a rocket, which explodes at a considerable height, is discharged during day or night *every half hour*. The effect of this signal more closely resembles that of a gun than an ordinary rocket, little light being shown, and it must be remembered that it is intended as a fog signal only, and not a summons for assistance.

**Distress Signals.**—Should assistance be required at the lighthouse, or by passing vessels, the signal will be a Call rocket of great brilliancy, showing a magnesium flame in falling, as well as a vivid rising trail; this rocket, which will only be used at night and in clear weather, will be fired at frequent intervals.

The lighthouse stands in latitude  $51^{\circ} 43' 15''$  N. and longitude  $5^{\circ} 40' 5''$  W., and bears from St. Ann high lighthouse N.W. by W.  $\frac{1}{2}$  W.,  $18\frac{1}{2}$  miles; from Lundy lighthouse, N.N.W.  $\frac{1}{2}$  W., 50 miles; from the Tuskar, S. by E., 35 miles; from the South Bishop lighthouse, W. by S  $\frac{3}{4}$  S.,  $12\frac{1}{2}$  miles; from the south extremity of Ramsey island, W. by S., 15 miles; and from Cardigan bay light-vessel, outside of Bais bank, S.W.  $\frac{3}{4}$  W.,  $48\frac{1}{2}$  miles.

**South-west Rock**, which forms the south-western extremity of this group, dries 5 feet, and lies S.W. by W.  $\frac{1}{2}$  W., 3 cables from the lighthouse; in the interval, and nearly in the same line, are two other rocks, which dry at low-water.

**East Rock** lies one-quarter of a mile, S.E. by E.  $\frac{1}{2}$  E. from the lighthouse; it is awash only at low-water spring tides, and must, therefore, be carefully avoided by vessels passing between the Smalls and Hats. One cable nearer the lighthouse is a rock which dries 4 feet. A third prong extends 2 cables N.E.  $\frac{1}{4}$  N. from the lighthouse, and terminates in North-east rock, which dries only at low-water springs and is steep-to on its northern side. On the north-west side of the Smalls there is nothing off-lying, and the lighthouse rock may be approached from that direction to within a quarter of a mile. The landing-place is on the south side, and receives some protection from the southern ledge of high-water rocks, which form a sort of cove at low-water, but when the tide is up the water flows through. A safe landing can seldom be effected; when practicable, a ball is hoisted on the lighthouse, and, if impracticable, an ensign.

**CAUTION.**—The rocks of this group are composed of trap, and have a powerful magnetic effect, for when a common steering compass is placed on them the needle is violently deflected, but if raised 6 feet above the rock it resumes its proper action.

**DIRECTIONS.**—To pass to the Southward of the Smalls, Hats, and Barrels.—In approaching from the westward, and passing to the southward of the Smalls, they should not be approached nearer than one mile till the lighthouse bears North, for as the soundings are very irregular, no dependence can be placed on the lead. In clear weather, a good mark to lead southward of the Smalls, and the dangers eastward, is to keep Dale valley (which shows as a gap in the land), just open to the north of Skokham, bearing about E. by S.  $\frac{2}{3}$  S., but it must be owned that neither the island nor the back-land are very easily made out at that distance; if seen, however, the gap in question is very conspicuous. This mark will lead  $1\frac{1}{2}$  mile southward of the Smalls and Hats, and about one mile south of the Barrels.

**At night**, so long as the red light of the Smalls is not opened, the Hats will be cleared to the southward by above half a mile; and St. Ann

lights, bearing S.E. by E.  $\frac{3}{4}$  E., will give the Barrels a berth of about the same distance. When Grassholm (if it can be seen), bears E.N.E., or the South Bishop light N.E.  $\frac{1}{2}$  E., the vessel will be to the eastward of the Barrels, and may then, if she is bound to Milford haven, haul up for Grassholm, in order to pass through Broad sound, which, with a scant wind and ebb tide, it is essentially necessary she should try to do.

**To pass to the Northward of the Smalls, Hats, and Barrels.**—In passing to the northward of the Smalls, give them a good berth in order to clear their north-east prong, which will have been effected when the lighthouse bears W.S.W.; and when the mainland is visible, an excellent mark to lead to the northward of all dangers is the south end of Skomar in line with the north-east end of Grassholm, bearing S.E. by E.  $\frac{3}{4}$  E. (*see view on chart 1,488*); this will lead about three-quarters of a mile from the Hats, in a depth of 28 or 30 fathoms, over gravel and broken shells.

**At night**, the northern side of these dangers will be cleared by not opening the *red* light of the Smalls; St. Ann lights should also be kept in sight between the bearings S.E.  $\frac{1}{4}$  E. and S.E.  $\frac{1}{2}$  S., when they will show between the islands of Skomar and Skokham. In fine weather, with a southerly wind and flood tide, should it be desirable to keep farther to the southward, when St. Ann lights are concealed by Grassholm and Skokham, the *red* light of the Smalls may be opened when the South Bishop light bears northward of N.E. by E.  $\frac{3}{4}$  E., a bearing which shows a vessel to be to the eastward of the Hats. She may then haul more southeasterly until the Smalls light bears W. by N.  $\frac{1}{2}$  N., which bearing will lead her nearly one mile northward of the Barrels, and across the bank that stretches N.N.E. from them, where may be obtained a depth of 10 fathoms, over gravel and broken shells, but where, as the water suddenly deepens to 30 fathoms upon both sides of the bank, will probably be found a heavy sea.

It may be well to repeat that the *red* light of the Smalls between the bearings W.  $\frac{1}{2}$  N. and N.W.  $\frac{3}{4}$  W. clears these dangers north and south, respectively, about one-half and three-quarters of a mile, and when the South Bishop light comes to the northward of N.E.  $\frac{3}{4}$  E., the Barrels may be passed to the eastward.

**Between Skomar and Grassholm.**—Grassholm and several rocky shoals divide the space between Skomar and the Smalls into four channels, each of which has its advantages to vessels bound either to or from Bristol channel or Milford haven. That between Skomar and Grassholm, is the safest, being 6 miles wide, with a true tide, and, with the exception of Mersey rock, which lies nearly half a cable from the east end of Grassholm, is free from dangers. Both islands may be approached within half a mile, and even this small offing would be unnecessary, were it not

for the races, which extend a full quarter of a mile from them. The flood stream sets through about N.N.E., and from a short distance to the westward of Skomar it takes a direction outside of Ramsey island, but inside of the Bishops, with a velocity of about 2 knots at neaps and nearly 4 knots at spring tides, and it continues to run till  $4\frac{1}{2}$  hours after high-water by the shore at St. Ann head.

**Between Grassholm and the Barrels.**—The channel between Grassholm and the Barrels, is, by daylight only inferior to the former from its less breadth. In passing through, it is prudent to keep nearer to Grassholm than to the Barrels, as nothing lies out from the former except some half-tide rocks near the shore and the race already adverted to; and even the Barrels may be safely approached by keeping Llaeithy hill open to the eastward of the high land of Ramsey island. In fine weather, at night, when the South Bishop light is seen, this channel may be taken, as Grassholm is a sufficient guide for the east side, and the Barrels will be avoided by keeping the South Bishop light to the northward of N.E.  $\frac{2}{3}$  E.; but as all bearings are uncertain guides, it would be unwise for a stranger to pass through this comparatively narrow channel at night, except in a case of necessity.

**Between the Barrels and Hats.**—The channel between the Barrels and Hats is safe in daylight and moderate weather, whenever a breaking sea shows the positions of these rocks, so as to enable a vessel to preserve a mid-channel course. But if the Hats should not break, keep Llaeithy peak in line with the northernmost of the two hills of Ramsey island, E.N.E. northerly, and it will lead through with certainty. Another mark for leading out to the westward from between the two patches, is the Garland Stone, off the north point of Skomar, in line with the south point of Grassholm, bearing E. by S., but it would be the height of imprudence to venture through in this direction at night or in hazy weather.

**Between the Hats and Smalls.**—The channel between the Hats and Smalls, the westernmost passage, is a safe one by daylight, although not more than  $1\frac{1}{4}$  mile wide. If the position of the Hats is shown by breakers, keep in mid-channel; if not, take care to avoid the rocks off the Smalls, should they not show themselves; the distance from the lighthouse may be estimated near enough to give them a berth of about three-quarters of a mile. If the mainland about Ramsey island can be made out, keep the South Bishop, three times the breadth of the islet open of St. David head, bearing E.N.E.; remembering that the head touching the Bishop leads over one of the detached rocks from the Smalls. This channel ought not to be wantonly taken at night, though, under very favourable circumstances, and with the exercise of great caution, it might, in case of necessity, be attempted, by keeping about one mile from the light.

**TIDES.**—From the Smalls to Grassholm the flood stream begins  $4\frac{1}{2}$  hours after low-water by the shore at St. Ann head, and runs N.E. by N. until  $4\frac{1}{2}$  hours after high-water; the ebb stream setting in a contrary direction, with very little slack water between them. Their rate varies from 2 to 3 knots, but over the shoals and through the channels the velocity is increased to 5 knots at springs. There are always eddies about these shoals, stronger or weaker of course, according to the period and rise of the tide, but requiring much skill and experience to be rendered available. Vessels often make good work when in the wake of the rocks, but are rapidly swept to leeward upon opening the different passages.

It will be observed from the above statement that it is not safe to play with these channels, and that they are better avoided, except at slack water, weak tides, or with a strong leading wind.

It is high-water, full and change, at the Smalls, at 6h. 0m.; the rise of spring tides was estimated at 19 to 21 feet, perhaps 17 feet would be nearer the truth, and 10 or 12 feet as the mean rise of neaps.

**Soundings outside the Smalls.**—Outside, or to the north-westward of the Smalls, there is nothing to be guarded against, the light-house rock being steep-to, and it is, therefore, only necessary when there, to be guided by the general directions for the Irish channel. It may, however, be well to remark that with a less depth than 43 or 40 fathoms (reduced to low-water) the mariner may be sure that he is within a line drawn from one mile and a half outside the Smalls to the same distance outside Bais bank; and when the South Bishop bears to the westward of south with a less depth than 40 fathoms, he will be near the end of that bank.

**Courses to Milford Haven, &c.**—Vessels going to or from either Bristol channel or Milford haven should consult the state of the tide when passing these reefs. If coming from the south-west coast of Ireland, and bound to Milford haven, it will be well to make Grassholm, which is frequently the first land seen, or at night the Smalls light. Should it be at the first part of the flood stream, and particularly if the wind be to the southward, it is best to pass well to the southward of the Smalls, so as to make St. Ann head or lights upon a bearing of about E. by S.  $\frac{1}{4}$  S., thus passing to the southward of Skokham; but during ebb tide, opposite measures must be adopted, and after having passed to the northward of the Smalls, St. Ann lights, if brought to bear about S.E.  $\frac{1}{4}$  S., will lead through Broad sound between Skomar and Skokham. With a northerly wind, ships would, of course, proceed by this channel. The above remarks are only offered as general hints, as everything must depend on the direction and force of both wind and tide at the immediate spot in which a vessel may happen to be.

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**ST. BRIDE BAY**, the entrance to which is between the islands of Skomar and Ramsey, is about  $6\frac{3}{4}$  miles wide at its mouth, and  $7\frac{1}{2}$  miles deep. Except off the coast on the north side, between Solfach creek and Ramsey sound, the whole bay is free from hidden dangers. The general character of the bottom is fine sand and mud, and therefore excellent holding-ground; the depths are regular throughout, diminishing from 24 fathoms to 10 fathoms within one mile of the low-water margin. At night, with less than 20 fathoms, and the South Bishop light in sight to the southward of Ynys-bery, a vessel is certain to be within the points of the bay. In strong winds between W.N.W. and S.W. a heavy sea tumbles home, which might render it difficult, if not impracticable, for a deep laden vessel to work out; and, therefore, great care should be taken to avoid being so caught. There are, however, two indifferent anchorages where a coaster might occasionally find some shelter, called Gouldtrop road and Solfach or Solva creek.

**Gouldtrop Road.**—E.  $\frac{3}{4}$  N., about 2 miles from Wooltack point, is Tower point, the bight between them having a depth of 10 to 5 fathoms in it; N.E. by E.  $\frac{3}{4}$  E.,  $1\frac{1}{2}$  mile from Tower point are Stack rocks; and S.E. by E.  $\frac{1}{2}$  E.,  $1\frac{1}{2}$  mile from the Stacks, Gouldtrop road, lying to the eastward of a head of the same name, forms the extreme south-eastern corner of St. Bride bay. A small vessel may anchor there in 3 or 4 fathoms, over sandy ground, about one-quarter of a mile E.  $\frac{1}{2}$  N. from the head, and ride quietly with the wind to the southward of W.S.W., but, if to the westward of that quarter, she would be much exposed.

A current runs to the westward on the south side of the bay, through this roadstead, and by Stack rocks, for 9 hours, turning about two hours before high-water on the shore.

**Solfach or Solva Creek** lies about 5 miles to the eastward of Ramsey sound, on the north side of St. Bride bay; an islet nearly fills its narrow entrance, but small vessels that can take the ground will find sufficient shelter in it.

**Life-Boat.**—A life-boat is stationed at Solva.

**Greenscar** is a large high islet, S.W. half a mile from the islet in the mouth of Solfach creek, having to the westward of it a rock named the Blackscar, with rocky patches extending from it for half a mile to the westward. There is also a rock above water called the Mare, one cable to the eastward of Greenscar, with a depth of 6 fathoms between them, and between this and the entrance to Solfach creek vessels may anchor in from 4 to 8 fathoms, but with little shelter from the heavy sea sent in by westerly winds.

**Porthclaise Rock**, which shows at half-tide, lies half a mile S.S.W.  $\frac{3}{4}$  W. from the west point of Porthclaise bay, and at the same

distance S.E. by E.  $\frac{3}{4}$  E. from Crow rock, with the south point of the latter rock and the south point of Porthlisky Bishops appearing in line. The highest hill of Ramsey island open of these Bishops, clears Porthclaise rock to the south-westward.

**Tidal Streams in St. Bride Bay.**—The tide streams are not strong when well within the points of St. Bride bay; the flood sets to the eastward on the south side, and out to the westward along the north side. The ebb runs in a contrary direction, so that there is generally a set out of the bay either on one side or the other, according as it is flood or ebb, a fact of which advantage might be taken.

There is a strong eddy on the north side of St. Bride bay, near Porthlisky, caused by the rush of the ebb stream through Ramsey sound, which must be guarded against, if working to the southward, by keeping sufficiently to the westward to be within the influence of the true tide. On the flood, a vessel must be well to the eastward, and pretty close to the entrance, before she will be within the limits of the true tide of Ramsey sound, as even with the entrance open, at only half a mile distant, the tide was found to set out towards Ramsey island.

Half-way between Skomar and Ramsey, the flood stream begins nearly 4 hours after low-water on the shore.

**RAMSEY ISLAND\*** lies about N.N.E. and S.S.W., and is one and a half mile long, and  $\frac{3}{4}$  of a mile wide at its broadest part. Several islets and large rocks are scattered round the southern portion of it; the largest of which, Ynys-bery, extends about half a mile in a south-westerly direction from the south point; and the rocks, which are all above water, lie so close to the island, and so far out of the proper track of vessels, that they require little further notice. Ramsey is partly cultivated, and has one farmhouse upon it near the middle of the eastern shore, close under which, to the northward of Bitches rocks, is the only good landing-place, the entire boundary of the island, with the exception of a small bay on the west side called Aber-mawr, consisting of high rocky cliffs. On the western side the land rises suddenly to a considerable elevation, forming Ramsey hill, 444 feet above high-water, a conspicuous object from the sea, and a very useful mark, as we have seen, for the shoals in the vicinity of the Smalls.

**Bitches.**—The Bitches form a curious ledge of high rocks, extending at right angles from the middle of the east side of the island for about 2 cables into Ramsey sound. A few low rocks, 10 or 12 yards outside its outer end, cover at first-quarter flood.

**Carreg Eilun.**—Two large rocks about one-quarter of a mile to the eastward of Ynys-bery, may be said to bound the west side of the entrance into the sound. The western rock, Carreg Eilun, is 83 feet high, but the other, Pontyr Eilun, nearly covers at spring tides.

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\* See Admiralty chart of Ramsey sound, No. 1,482; scale,  $m = 3 \cdot 0$  inches.

**Sylvia Rock**, discovered by her Majesty's cutter of that name being swept over it, lies S.  $\frac{1}{2}$  W. about half a mile from Carreg Eilun, and in the fairway into Ramsey sound, it has been found to have as little as 3 fathoms over it, but, as there may be less, it had better be avoided in blowing weather.

St. David head, in line with Penman Melyn point, bearing N.N.E.  $\frac{1}{2}$  E., leads just to the eastward of Sylvia rock; and Daufraich, the rock next eastward of the South Bishop, open of all the rocks off Ynys-bery, N.W.  $\frac{3}{4}$  N., leads nearly 2 cables to the south-westward of it.

**Shoe Reef** lies about an eighth of a mile S.S.W.  $\frac{1}{4}$  W. off Penman Melyn point, on the east side of the entrance of the sound, but is connected to it by low rocks which only partly uncover at low-water; the outer end of the reef, or what is called the Shoe, dries about half-tide. St. David head, kept well open of the point, N.N.E.  $\frac{1}{2}$  E., leads to the westward of the reef.

**Horse** is a very dangerous rock near the middle of Ramsey sound, for it dries only 3 feet at low-water spring tides; and though its position is generally shown by overfalls, yet at neap tides and near slack water, it is not always to be made out distinctly. From its centre, the south part of Carreg-trai (one of the Clerks, which nearly always shows) is just open of the north-east point of Ramsey island; and the centre of Gafaeliog is in line with Pencarnen point.

To clear the Horse to the westward, bring Penman Melyn point in line with a conspicuous cliff or break in the ridge of Skomar island near its eastern end, S. by W.; and to pass to the eastward of the rock, keep St. David head just shut in behind Pencarnen point.

**Gwahan Rock** is a large mass N. by E.,  $\frac{4}{10}$  mile from the north-east point of Ramsey island; it is always above water, and may be approached within a reasonable distance, there being a safe channel between it and the island. The name implies that it splits the ebb into two streams.

**Gafaeliog**, a large rock about one cable from Pencarnen point, always shows its head, which is ten feet above high-water, and is nearly joined to the point at low-water by a reef. As foul ground extends in other directions with very little water over it, the rock should not be approached within 50 yards, at the least.

**RAMSEY SOUND** is a straight navigable channel of about 2 miles in length, and from one-quarter to two-thirds of a mile in breadth, the narrowest part of the passage being abreast the Bitches. Its western side is formed by Ramsey island, and its eastern side by the coast of Pembroke-shire from Penman Melyn (the north point of St. Bride bay), to Pencarnen point, the whole extent of which is a rocky but safe shore, only excepting Shoe reef, already described as projecting from the former point.

**Depths.**—It would be useless to describe the depths in Ramsey sound as, from the rapidity of the tides, it would be impracticable to get a couple of casts before a vessel is swept through; but there is plenty of water for the largest vessel, though the depths are exceedingly irregular.

**Anchorage.**—A few small vessels may find snug anchorage in Ramsey sound while waiting for tide, even in blowing weather, except with northerly winds, which usually bring in a heavy swell. The best berths are upon the western side about a cable and a half to the northward of the Bitches, and at the same distance from the shore. They will lie there in 6 fathoms and well clear of the Sound stream; a precaution to which the pilot should particularly attend. In proceeding to the anchorage, care must be taken with a flood-tide not to round the Bitches too closely, as the eddy extends from them for some distance. On the ebb, a vessel may take up her berth with more facility.

**TIDES.**—It is high-water by the shore in Ramsey sound, full and change, at 6h. 0m.; spring tides rise about 17 feet. The stream runs through the sound for at least three hours after the turn of high and low water by the shore, with about 20 minutes of slack water on each tide.

**Flood Stream and Eddies.**—It has been already stated that, unless near the entrance to Ramsey sound, and well to the eastward, the flood stream scarcely draws into it, but sets across towards the outside of Ramsey island. Within one-quarter of a mile, however, of Penman Melyn point, a vessel will find herself within its influence, and will be swept through with great velocity. In the narrow part of the sound, between the Bitches and Horse rocks, the rate of spring tides is 6 knots, decreasing to 3 knots near Gafaeliog, from whence it sweeps gradually round St. David head at the distance of half a mile from the shore.

The branch of the flood stream which sets along the outer side of Ramsey island bends round its north end, and then, meeting the stream from the sound, produces a strong eddy, which sets back to the southward along the eastern side of the island, as far as the Bitches. Another eddy, or counter tide, will be found on the eastern side of the sound, reaching to as far as the Horse, and then forming itself into highly dangerous vortices. To an experienced pilot, however, these eddies are sometimes of great service in working up to an anchorage.

**Ebb Stream and Eddies.**—The ebb stream, after setting closely round St. David head, strikes right upon Gwahan rock, near which it divides; one stream passing outside of Ramsey island, and the other through the sound.

The ebb also forms two eddies, one returning along the western side of the island from Ynys-bery to the north point, where it unites with the true tide; the other begins at the Horse, and running along the eastern side of the sound to as far as St. David head, there also meets with the true ebb

stream. These eddies are not felt until the first quarter of the tide, that is to say, not until it has acquired its strength.

**Directions.**—Slack water is obviously the best time for going through Ramsey sound, attending to the marks for clearing the dangers. Should the tide, however, have made, the passage may be attempted if necessary, but only with a leading wind and great attention to the helm, as the eddies sometimes cause a vessel to take an alarming sheer; small vessels very commonly have a sweep over the stern for the purpose of assisting the helm, the great object being to keep in the fair stream of tide. If intending to pass through the sound on the ebb, it will be prudent to keep near St. David head, for, if too far to the westward, the stream will inevitably carry a vessel outside of Ramsey island; and, if bound to the northward on the flood, a similar precaution is necessary when crossing St. Bride bay.

Notwithstanding Ramsey sound has plenty of water for ships of any size, yet, whether used as an anchorage or a passage, owing to its narrowness in some parts, and the violence and eccentricities of its tides in others, it is undoubtedly a very hazardous channel for square-rigged vessels.

**Life-Boat, &c.**—There is a life-boat stationed near St. Justinian in the sound of Ramsey, and a rocket apparatus at or near St. David's.

**BISHOPS AND CLERKS.**—The well-known group of islets and rocks, the Bishops and Clerks, are to the westward of Ramsey island, and are dispersed over a considerable space, their extremities being more than 3 miles apart. Fortunately for the navigator, the four islets, or Bishops, which are of considerable elevation, lie on the outside nearly in a straight N.E.  $\frac{1}{2}$  N. and S.W.  $\frac{1}{2}$  S. direction, and, being for the most part bold-to, the seaman may, with ordinary prudence, avoid the dangers.

**SOUTH BISHOP and LIGHT.**—The Emsger, or South Bishop, as its name implies, is the south-westernmost of the group, and is crowned by a circular white lighthouse, which stands near the centre of the islet. The light, which is *white*, and 144 feet above high-water, *revolves every twenty seconds*, and is visible at the distance of 18 miles in clear weather.

**Fog Signal.**—The signal consists of *two* loud reports, following each other in quick succession, produced by means of a powerful rocket, and is, during thick or foggy weather, repeated *every fifteen minutes*; a bell is also sounded, giving a *single stroke every twenty seconds*.

The lighthouse bears from the west end of Skomar island, N.  $\frac{1}{2}$  W., distant 8 miles; from Grassholm, N.E.  $\frac{1}{2}$  N.,  $7\frac{3}{4}$  miles; and from the Smalls lighthouse, E. by N.  $\frac{5}{8}$  N.,  $12\frac{1}{2}$  miles.

The South Bishop is about two-thirds of a mile from Daufraich, and, as the channel between them is free from eddies, has a true tide, and is quite safe, it may be used at any time, with a favourable stream. There are a few sunken rocks near the north-east end of the South Bishop, just within

the mooring buoys, but they do not extend more than one cable from the island; there is also a tide race spreading for a short distance from its south-west end, which should be avoided.

A bank of sand, gravel, and broken shells, stretches for 3 miles to the southward of the South Bishop, with not more than 15 fathoms over some parts of it, which is suitable for a vessel to anchor upon to wait a tide. A good mark for this purpose is to keep Daufraich in line with the low western extremity of the North Bishop, or Carreg Rhoson, until a convenient depth is found.

**Daufraich** is long and flat, and, unlike the South Bishop, is unsafe of approach on its eastern side, or between it and Ramsey island, on account of some low and dangerous rocks which lie one-third of a mile from it, and hereafter to be noticed with the Clerks. By giving the islet a berth of one-quarter of a mile to avoid Maen Daufraich, a low-water rock, which lies a cable to the northward of it, vessels may pass safely between it and Carreg Rhoson.

**Carreg Rhoson**, the largest of the group, is prolonged east and west by ranges of high rocks, so that its collective length is about two-thirds of a mile. Making due allowance for the eddies, which are found more or less among all these islets, it may be safely approached, as it is free from sunken rocks.

There is a very tolerable channel between Carreg Rhoson and the North Bishop, which, in daylight and with neap, or slack tide, may be safely adopted.

**North Bishop.**—Carreg Uchaf, or, as it is more commonly termed by seamen, the North Bishop, is W.N.W.,  $2\frac{3}{4}$  miles from St. David head, and, in coming out of Cardigan bay, it is the first of the group that opens clear of the head. The summit of the islet is 120 feet above high-water, and it breaks down at each end to a chain of high rocks, extending from it W. by S.  $\frac{1}{4}$  S. and E. by N.  $\frac{1}{4}$  N., and making its whole length rather more than half a mile.

**Bell Rock.**—This sunken rock, which had not hitherto been marked upon the charts, was found, in September, 1869, to have 8 feet over it at low-water springs; it lies E. by S.  $\frac{1}{2}$  S.,  $2\frac{1}{4}$  cables from the eastern rock off the North Bishop; with the western part of Carreg-trai bearing S.E.  $\frac{1}{8}$  E.; centre of Carreg Rhoson, S.W.  $\frac{1}{2}$  S.; and the South Bishop, in line with the two outer rocks of Carreg Rhoson, S.W.

There are no other outlying dangers near the North Bishop, but rocky 8 and 10-fathoms patches to the westward cause great overfalls and whirls of the tide, making it advisable, especially in blowing weather and at spring tides, not to approach on that side nearer than one mile.

**THE CLERKS.**—Besides the Bishops, there are five other islets or rocks of smaller dimensions, named their Clerks; these latter are dangerous

to strangers attempting the passage between the Bishops and Ramsey island, as some of them cover at the last-quarter flood, and cause at springs the most alarming eddies and whirls of the stream; but it may be useful to remark that none of these rocks lie to the southward of Daufraich, nor to the northward of the North Bishop—nor, which is of greater importance, are any of them to the westward of the group.

**Carreg Trai**, which means the ebb-tide rocks, are nearly midway between the North Bishop and St. David head, bearing from the former S.E. by E.  $\frac{1}{4}$  E., distant  $1\frac{1}{4}$  mile, and from the latter W. by N.  $\frac{1}{4}$  N.,  $1\frac{1}{2}$  mile. These rocks, which show as three heads at low-water, uncover at the first-quarter ebb, and their position is generally indicated before that by the sea breaking over them. They may be approached on all sides within one-quarter of a mile, having, except upon a short ledge at their eastern end, deep water all round.

**Maen Rhoson** is a detached rock, high above water and safe of approach, 2 cables N.N.W.  $\frac{1}{4}$  W. from Carreg Rhoson.

**Llech Uchaf and Llech Isaf**, or the Upper and Lower Flat Stones, lying midway between Daufraich and Ramsey island, appear to belong to one ledge, as there is shoal water between them—the northern rock does not cover, even at spring tides, and the other only at the last-quarter flood. These rocks, when seen, distinctly mark the channel between them and Ramsey island, which, although narrow, is a good one, and to be preferred to any other in the vicinity, from the direct course of the stream through it, and the bold character of Ramsey island, which is the safer side to keep upon. This passage is, in fact, a safer one than that through Ramsey sound, as the streams are not so rapid and eccentric as they are in the latter.

The ground about the rocks is uneven and foul, with heavy overfalls; and half a mile S.S.W. from them is a rocky 7 and 8-fathoms patch, upon which is also a heavy overfall.

Llech Uchaf, which always shows, is S.E.  $\frac{1}{2}$  S., about one mile from Carreg Rhoson; and Llech Isaf, seen till nearly high-water, is 4 cables S.W. by S. from the former, with Ramsey hill bearing from it S.E. by E., and the cliffs of the island about two-thirds of a mile distant.

**Moelyn, Cribog, and Maen Daufraich**, three very dangerous rocks, lie on the bank within Daufraich islet, the Maen being about one cable to the northward of it; Cribog  $1\frac{1}{2}$  cable E.  $\frac{1}{4}$  S. from it, and Moelyn more than one-third of a mile in the same direction, leaving no safe passage between them. Moelyn covers at the last quarter of the flood stream, or a little after half-tide by the shore, but the other two only show themselves at low-water springs.

There is a channel between Moelyn and the two Llechs, which, as far as depth of water is concerned, may be taken in case of necessity; but,

as it is very narrow, and with a rapid whirling tide, it should not be attempted under any circumstances, unless the rocks on both sides are above water.

**TIDAL STREAMS near the BISHOPS.**—The flood stream,  $1\frac{1}{2}$  mile to the westward of the Bishops, sets N. by E.  $\frac{1}{4}$  E., rather more than 2 knots at the dead of the neaps, and about 5 knots at the height of the springs. After passing the Bishops, the flood draws gradually round to the eastward, and sets outside Bais bank; but from the North Bishop the stream sets inside the bank in an E.N.E. direction.

The flood, near the south end of Ramsey island, follows the general direction of its shore, setting between it and the Llechs, continues to the northward, and then trends gradually to the eastward round St. David head. At 2 or 3 miles to the westward of Ramsey island it sets outside of all the Bishops well to the northward; and everywhere near there the stream may be considered to run for about  $3\frac{1}{2}$  hours after the tides by the shore.

Within Carreg-trai, the ebb, or southern stream, sets inside of the Bishops, but varies its direction through the different channels, its general course being about W.S.W. Near Ramsey island, its course is more southerly, following in an opposite course to the flood the direction of the island, and setting pretty fairly through the channel between it and Llech rocks.

Between Carreg-trai and the North Bishop, the ebb stream pursues its W.S.W. course, passing outside Carreg Rhoson; but between Bais bank and North Bishop it sets nearly W. by S., afterwards resuming its more southerly direction, but with decreasing strength; near the North Bishop it runs nearly 6 knots at springs.

**GENERAL DIRECTIONS.**—Coasters bound to or from the Bristol channel are often compelled to make their way through this dangerous collection of rocks, a description of which with their channels has been already given, but it is necessary to repeat that the passage between Ramsey island and the two Llechs is preferable to Ramsey sound, and also that in coming from the eastward it is advisable to keep within Carreg-trai. The channel between Carreg Rhoson and the North Bishop is also a safe one in fine weather and at neap tides, but at spring tides in windy weather a dangerous overfall is formed over the rocky bank lying out from the west end of the North Bishop.

It cannot, however, be too strongly impressed on all those who frequent this neighbourhood, that none of the passages should be attempted at night, or in thick weather; also, that all vessels, large or small, which may be outside Bais bank and bound to the southward, should keep outside of the Bishops and their Clerks, as they will then have truer tides, smoother water, and freedom from danger. For this purpose the South Bishop light



at night should not be brought to the westward of S. by W.  $\frac{1}{2}$  W., as that bearing will give the south-west end of Bais bank a berth of about one mile, in a depth of 36 fathoms at low-water, except just over the tail of the bank, where the depth will be about 32 fathoms; it will then gradually diminish to 25 or 24 fathoms, as the South Bishop light is approached.

**BAIS BANK** is a narrow ridge of fine sand and small broken shells; it begins near the North Bishop, 10 fathoms upon its south-western extremity bearing from the islet N.  $\frac{1}{2}$  E., distant  $1\frac{1}{2}$  mile, from whence holds straight N.E. by E.  $\frac{1}{2}$  E. for  $4\frac{1}{2}$  miles, the breadth in places being rather less than one-third of a mile.

**Bais patches.**—With the exception of three patches, which begin one and a quarter mile within the south-west end of the bank, and which extend from thence for three-quarters of a mile to the north-eastward, the general depths on the bank are 5, 7, and 8 fathoms, increasing to 12 and 15 fathoms, and then suddenly deepening to 20 and 25 fathoms. Though 23 feet was the average depth over the patches, with swashes of 5 fathoms between them, in 1838, there is reason to believe, from the moveable character of the sand and the sets of the tide, that the ridges rise in height, and that the general figure of, and the depths on, the bank are liable to change. The south-west end of the patches bears from St. David head N. by W.  $\frac{3}{4}$  W., distant  $3\frac{1}{4}$  miles; and N.E.  $\frac{3}{4}$  N.,  $2\frac{1}{2}$  miles from the North Bishop; and their north-east end is N.  $\frac{3}{4}$  W.,  $3\frac{1}{2}$  miles from St. David head. The north-east extreme of the bank, in 20 fathoms, from the same head is N.N.E.,  $5\frac{1}{2}$  miles.

**Tidal Streams.**—Outside Bais bank the flood-stream sets N.E. by E.  $\frac{3}{4}$  E., at a mean rate of about 2 knots, and inside or to the south-eastward of it, it veers to about E.N.E. The ebb stream outside of the north-east end of the bank runs W. by S., and inside and near the south-west end of the bank it sets about W.S.W., with the same velocity as the flood. The stream over the bank turns three hours after high and low-water by the shore at Fishguard, and  $2\frac{1}{4}$  hours later than in Ramsey sound.

**Directions.**—With a weather-going tide and strong wind, a terrific sea breaks over the shoal parts of the bank, and is thrown up into the air in one sheet of foam.

The mark for the south-west 10-fathoms termination of Bais bank is, the detached rocks off the south-west end of Ramsey island, in line with the extremity of the detached rocks off the east end of the North Bishop, bearing South; and for  $4\frac{1}{2}$  fathoms upon the south-west end of the short ridge, the North and South Bishops in line, S.W.  $\frac{2}{3}$  S.; and the peak of Ramsey hill, over the west end of Carreg-trai rocks, S. by W.  $\frac{1}{4}$  W. The north-eastern part of the Bais is thus marked: the outer Bitch, just

shutting in behind Ramsey island, bearing S. by W.  $\frac{1}{4}$  W., leads across the ridge in 6 or 7 fathoms; and Carreg Eilun, closing in behind the island, S.S.W., leads in 10 fathoms clear of the main ridge. Farther to the north-eastward, however, there are two knolls with only 7 or 8 fathoms on them; and Penman Melyn, or Pencarnen point, in line with St. David head, S.S.W.  $\frac{1}{4}$  W., clears them on the inside, as well as the Whale bank, in 24 fathoms. The general clearing marks for the two extremities of the bank are the North Bishop, in line with Ramsey hill, bearing S. by E., which crosses its south-western tail in 13 fathoms; and Carreg Eilun, seen nearly midway between Ramsey island and St. David head, S.S.W.  $\frac{1}{4}$  W. (view A., chart 1,410), which leads well to the eastward of the bank, and through an excellent deep-water channel. It is advisable to take this channel if intending to go through Ramsey sound.

Should it be desirable to pass from this inshore channel outside the Bishops, then the South Bishop and Carreg Rhoson in line, bearing S.W.  $\frac{1}{4}$  W. (view B., chart 1,410), will lead to the south-eastward of the bank, and sufficiently to the westward of Carreg-trai. As the mark for the south-west end of the bank comes on, the seaman must exercise his own judgment as to the propriety of passing inside or outside of the North Bishop; if he decides on the latter course, he must take care not to get too far to the southward, or the tide will inevitably sweep him to the eastward of the islet.

The lead is the best guide in weather when the bank does not show itself, which seldom occurs; and anything less than 20 fathoms must be the warning to tack.

Vessels with a less draft than 14 feet may always, if so disposed, cross any part of Bais bank, providing there is not much sea over it.

Vessels intending to keep outside of the bank at night, should not bring the South Bishop light to the westward of S. by W.  $\frac{1}{4}$  W., a bearing which will give the south-west end of the bank a berth of about one mile; and, in approaching the bank from the northward, they should not, in blowing weather, pass within the 40-fathoms line, until the South Bishop light bears S.  $\frac{3}{4}$  W.

**ST. DAVID HEAD**, though not more than 100 feet high at its outer pitch, may be easily recognized by its proximity to the remarkable hill of Llaeithty, with which it is connected by a low bed of slate, the hill and the headland being both composed of trap rock. Llaeithty peak is elevated 592 feet above high-water, and is steep on all sides.

Penberry is another remarkable hill only a few feet lower than Llaeithty, and which it somewhat resembles; its summit is rugged when seen from a westerly direction. The two hills are portions of the same chain, and, as they are only  $1\frac{1}{2}$  mile apart, care should be observed not to mistake them when Llaeithty is used as a mark for avoiding the dangers near the Smalls,

but, with a little attention to the relative position of Ramsey island, this can scarcely happen.

From St. David head, the coast extends to the eastward for about  $9\frac{1}{2}$  miles, when it turns suddenly to the north-north-eastward, forming the conspicuous promontory of Pen Caer, the south-western and north-eastern extremities of which are Penbrush point and Strumble head. For the first 3 miles from St. David head the coast is steep and bold, but in the slate district from thence to Penbrush point, great ravages have been made in the shore, and the effects are seen in several important dangers scattered about it.

**ROCKS OFF ABEREIDDY.**—Three of these rocks, the Isaf, Garrol, and Uchaf, lie close to the little port (if it may be so called) of Abereiddy; they dry after half-tide, and, with others inshore of them, render the approach to Abereiddy extremely hazardous to a stranger.

**Uchaf Rock.**—The marks for Uchaf rock are, Carreg-guilan point (from which it is distant half a mile), in line with the north part of the outer rock lying off that point; a small ravine on the south side of Abereiddy bay, in line with the outer part of Summer-house point, on the north side of the bay; and a ruined mill on the high land one mile and a half inshore, in line with the rocky hummock called Garnfach, which rises from the shore about a quarter of a mile east of Summer-house point.

**Garrol Rock** is three-quarters of a mile W. by S.  $\frac{1}{2}$  S. from the Uchaf, and the little rocky hummock of Garnfach touching the north part of Summer-house point leads over it.

**Isaf Rock** bears from the Uchaf, W.  $\frac{1}{2}$  S., distant  $1\frac{1}{2}$  mile, and from Penberry hill, N.N.E.  $\frac{1}{2}$  E. The South Bishop shut in upon St. David head, about 4 or 5 degrees, would lead over it.

**Directions.**—The foregoing three rocks, sometimes called the Llechau Cochion, may be all cleared to the northward by keeping the South Bishop open of St. David head, bearing about W. by S.  $\frac{3}{4}$  S. (view C., chart 1,410). Penberry hill to the southward of S.  $\frac{3}{4}$  W. will clear them to the westward; and they are cleared to the eastward when the ruined mill on the high ground is to the southward of S. by E., or open to the eastward of Garnfach. If very close inshore, near the rocks, the Old mill would most probably be sunk below the high land near the coast, and, therefore, the ruin, which is a conspicuous object, should always be kept in sight when in the neighbourhood of these rocks.

**Monkey Rock and Maen-traeth**—are two other rocks which are dangers to vessels bound to Abereiddy bay to land slate; but to the general navigator they are of little moment, as no vessels, except those using the bay, would be justified in sailing inside the Llechau Cochion. The Monkey never dries, but is surrounded by very shoal water, and lies nearly

half a mile S.  $\frac{3}{4}$  W. from the Isaf, and one cable from a high rock connected with the shore. The other rock, Maen-traeth, lies about a fifth of a mile W.N.W. from the Summer-house, and dries only at low-water spring tides.

Vessels from the westward bound into Abereddy bay must keep Garnfach just touching, or perhaps a little open of the north part of the Summer-house, which will lead clear of Monkey rock on the one hand, and well inside the three rocks, the Llechau Cochion, on the other.

**Maen Griffith** is another rock to be avoided by vessels going into Abereddy, as it dries at low-water spring tides, and lies one-third of a mile to the westward of Penclegyr point; Garnfach in line with the inner Carreg-guilan rock, leads over it, and if kept open to the westward of the outer Carreg-guilan will clear it; but this mark is likely to lead over the shoal ground off the end of those rocks. After half-flood, however, there is water enough there for the ordinary class of coasters.

**ABERCASTEL.**—Nearly 3 miles to the eastward of Penclegyr point, and about 8 miles from St. David head, is the entrance of the little port and fishing village of Abercastel. As it affords no shelter even for the smallest vessels it needs no further description.

**Bola Bleiddyn.**—Off Abercastel, and half a mile N. by E.  $\frac{1}{4}$  E. from Daullyn island, is a dangerous rocky patch called the Bola Bleiddyn, with not more than 13 feet over it at low-water, and therefore an obstacle to coasters. Upon it, Garnfawr hill is in line with Carreg Dû, and the Cairn is just open to the eastward of the highest point of Daullyn island.

To clear it to the northward, keep Garnfawr hill open north of Carreg Dû, and to clear it to the southward keep Garnfawr in line with Penbwch Dû. The Cairn open to the eastward of Daullyn island clears it to the eastward, and when open to the westward of the island clears it to the westward.

**Tre-maen Rocks.**—From Abercastel to Strumble head there are no dangers, except the Tre-maen, a few half-tide rocks lying in the bight between Penbwch Dû and Penbrush point, but as no vessel has any business in this bight, directions are unnecessary.

**Tidal Streams and Depths.**—The tidal streams between St. David head and Strumble head are pretty regular in their course at some distance from the shore; the set of the flood-stream being about E.N.E., and that of the ebb W.S.W., with a mean rate of rather more than 2 knots.

For the whole distance between the heads a depth of 20 fathoms will be found about one mile from the shore, on the average, and the same depth occurs close to the headlands. The line of 30 fathoms is only from 4 to 5 $\frac{1}{2}$  miles from the coast, and leads nearly in the stream of Bais bank.

**Directions.**—The coast from St. David head to Strumble head consists of moderately high cliffs, with occasional breaks, and many hamlets and farms show on the higher background.

Having made Strumble head before night-fall, and being desirous of maintaining a good offing in the expectation of bad weather, it is not advisable to shoal the water to less than 40 fathoms, as that depth will give Bais bank a berth of about 3 miles.

In fine weather, and intending to pass inside Bais bank, observe that as long as the South Bishop light is kept in sight open of St. David head, all dangers of this coast are avoided; the light closes behind the head on a W. by S.  $\frac{1}{2}$  S. bearing; but it is necessary to remember that the South Bishop light may also be obscured by Carreg Rhoson on a S.W.  $\frac{1}{2}$  W. bearing. A good course by soundings, is not to shoal the water on either side of the channel to less than 25 or 24 fathoms; and on the Bais side of it the lead will be an infallible guide, for with 20 fathoms a vessel will most certainly be close to the edge of that bank.

**STRUMBLE HEAD** stands prominently forward, and is one of the most conspicuous headlands in South Wales. It is a barren and rugged mass of trap rock, forming the north-eastern point of Pen Caer, which is the general name of the promontory. The hill of Garnfawr, with a rugged rocky summit, rises to the height of 700 feet; it has steep and remarkable sea faces, and is a valuable object for assisting the seaman to identify this portion of the coast.

**CARREG ONNEN ISLETS.**—The two Carreg Onnen islets, or rather bare rocks, lie close to the western spur of the head, and at low-water the inner and higher one is joined to it. They may be safely approached to within one-quarter of a mile, as there is a depth of 19 fathoms at that distance.

**Strumble Rocks** are two small masses close under Strumble head, and which only appear at very low tides, but, though they are close in, they are dangers to the small coasters that creep round this headland, to take advantage of the tide. One of them is E.  $\frac{1}{4}$  S., one cable, and the other is W.N.W., the same distance from the north-east pitch of the head, but only half a cable from the shore, therefore in passing this portion of the head a proper distance from the shore must be maintained. Every other part of the head is bold-to.

**ABERFELYN.**—From Strumble head, the coast has a general direction S.E. by E.  $\frac{1}{4}$  E. for  $2\frac{1}{2}$  miles to the low sharp rocky point Pen Anglas, which forms the north-western boundary of Fishguard bay; the whole of it is low, rugged, and rocky, and so bold-to that a vessel might almost rub her sides against any part of it. In the little creek Aberfelyn,  $1\frac{1}{4}$  mile to the westward of the point, the French effected a

landing in 1797, and the farmhouse, Trehowell, was their head-quarters on the occasion.

**STRUMBLE BANK**, formed of gravel and broken shells, lies about one mile out from the coast between Strumble head and Pen Anglas; on some parts of it there are 9 and 10 fathoms at low-water, but within it there is a deep gut with 20 to 24 fathoms in it. With spring tides and blowing weather, a heavy sea and overfall is formed here, which it is well to avoid, and a good mark for keeping outside of the bank is Brenin-fawr mountain well open to the north-eastward of Dinas head (view D., chart 1,410). This precaution, however, is only necessary when it is blowing hard, for, in general, the shore must be kept aboard when working to the westward from Fishguard bay, in order to derive the benefit of an eddy-tide, which, running to the westward 3 hours before the ebb makes in the offing, gives a 9 hours' ebb set close inshore between Pen Anglas and Strumble head. This eddy reaches about half a mile out from the shore, or nearly to the inner edge of Strumble bank.

**Tidal Streams near Strumble Head.**— Five miles to the northward of Strumble head the stream of flood runs E. by N., and closer in, to the southward of east, so as to supply Fishguard bay. The ebb stream at one mile off sets nearly parallel to the shore from Fishguard to Strumble head, where it resumes its proper channel course, as it does also 5 miles to the northward of Pen Anglas, gradually trending thereto in proportion to the distance from the shore. Close in, the spring tides run about three knots, and the neaps  $1\frac{1}{2}$  knot. Between Strumble head and Pen Anglas, the stream of flood makes  $2\frac{1}{2}$  hours after the tide by the shore at Fishguard.

**FISHGUARD BAY\*** is included between Pen Anglas and Dinas head, the distance between which is 3 miles. The depth of the bay is  $1\frac{1}{2}$  mile, and its shores consist generally of rocks of moderate height, backed by rugged eminences, which serve to mark it from every direction seaward.

The most remarkable of its hills are Llanllawer and Dinas head; the former, a conspicuous mountain 1,107 feet above high-water,  $2\frac{1}{2}$  miles S. by W.  $\frac{1}{2}$  W. from Dinas head, is the beginning of a rocky ridge which runs nearly parallel to the coast for 3 miles, and terminates in another remarkable rugged top named Carningly peak or hill, 1,152 feet above the sea. Llanllawer may be readily recognised by a sharp rock on its summit, called the Garn Llanllawer, but more generally known among seamen as the Nipple rock. The above ridge is separated from Precelly mountain range by a deep ravine, through which flows the river Gwain into Fishguard bay.

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\* See plan of Fishguard bay, on Admiralty chart, Bristol channel to New Quay, No: 1,410.

**Cow and Calf** form a ledge of rocks extending E.N.E. for more than one cable from Pen Cow, the point next within Pen Anglas; the summit of the Cow, the inner rock, is 17 feet above high-water springs, at which time the Calf is under water, but the latter does not cover at high-water neaps. The outer small rocks show only at low-water springs, but as they have deep water close to them they may be safely approached. Pencommon farm-house, having a long roof with a chimney in the centre, in line over the bridge-houses at the south end of Goodic sands, bearing S.W., clears the Cow and Calf well to the south-eastward.

**Goodic Sands.**—The shores of Fishguard bay are principally composed of slate, several quarries of which are worked. Near the town is a sandy strand, Goodic sands, upwards of half a mile in length, fronting Goodic moor or marsh; it extends 450 yards from high to low-water mark, and afterwards shelves for about the same distance to the 2-fathoms line of depths. Just where the low-water margin joins the northern shore is a small fishery pier built by the proprietor.

**Life-Boats.**—Two life-boats and apparatus for communicating with stranded vessels are kept in constant readiness, one boat being stationed at Goodic, and the other a short distance within Pen Cow.

There is a similar but smaller beach, the Pwll-gwaelod, which terminates a strip of swamp that lies within Dinas head, and almost insulates it. This beach has better shelter than that of Goodic, and small vessels frequently lie upon it in fine weather and easterly winds.

**Fishguard Road.**—The outer bay, or Fishguard road, is of great importance to the coasting trade, affording, as it does, good shelter from all winds except those between North and East, and it is extensively frequented during the summer months by small vessels requiring shelter, or waiting for the turn of tide. The best anchorage is on the west side of the bay, about a quarter of a mile inside Cow and Calf rocks, and fronting Goodic sands, from whence it is frequently termed Goodic road. The mark for the anchorage is, Pen Anglas, appearing between the Cow and Pen Cow, bearing North; and Pencommon farm-house, over the bridge-houses at the southern end of Goodic sands, S.W.; here is a depth of 4 to 5 fathoms at low-water springs, over a bottom of mud coated by sand.

Though Fishguard road affords good shelter to small vessels in north-west winds, yet large ships should not then make too free with it, for at low-water springs there is only 5 fathoms in the best part of the anchorage, and, with the wind drawing in, a heavy sea is sent home, which might render it no easy matter to obtain an offing. On the other hand, the ground is excellent, and, with good tackling, a ship would hold on for a long time. It may be added that, with the exception of St. Tudwall roads, Fishguard

road is the only tolerable anchorage between St. David head and Bardsey island.

**TIDES.**—It is high-water, full and change, at Fishguard, at 6h. 56m.; ordinary springs rise  $12\frac{1}{2}$  feet, neaps  $9\frac{1}{2}$  feet, and neaps range 6 feet.

A weak stream sets into Fishguard bay on the south side, and round out on the north side, from about high-water to the following half-flood; during the remaining three hours there is no stream. If at anchor in the road, care must be taken not to be caught by the wind to the eastward of North, but to leave as quickly as practicable on the first appearance of a shift in that direction. In such a case the young ebb will greatly assist a vessel in getting round Strumble head, which, with the wind at North, could not be weathered without an offing of 2 or 3 miles. As the flood tide, however, would still be running at that distance from the land, it is better to make short tacks close in, so as to have the advantage of the westerly-going eddy described on p. 25.

**Fishguard Port.**—In a little bay near the south end of Goodie sands, formed between Saddle point to the westward, and Castle point (with a ruined fort on it) to the eastward, the river Gwain discharges itself, and the outlet of it constitutes the port of Fishguard. The town stands on the summit of the left bank, while Abergwain or Fishguard Bottom, as it is at times termed, skirts the foot of the right bank by the side of the harbour.

There is an old pier of rubble stones on the eastern side, within which, moored with stern anchors or anchors ahead and warps to the quay, a few vessels of 10 to 12 feet draught may find shelter in springs, and those of 5 or 6 feet draught at neaps. The greatest in-run is in northerly and north-easterly gales, but this is partly checked and some accommodation afforded by a short pier, built about 300 feet outside the old one. The whole of the harbour is dry long before low-water, and at spring tides the ebb leaves the sand and mud uncovered to abreast the outer pier. The bottom of the harbour is mud and clay, with a coating of gravel.

In entering, keep midway between the points, and be careful of the numerous limestone heaps which are scattered about upon the west side. In north-easterly gales, vessels have been frequently wrecked when running for the harbour, on account of the heavy sea sent home in those winds. Vessels riding in the road are often caught by the wind backing to the northward, and at such times it is usual to obtain a pilot by signal from Goodie quay, and to run for the harbour at tide time, but in case of extremity, the best plan is to beach in the north corner of Goodie sands, right under the village.

Fishguard has little export trade, but coal, culm, and limestone in considerable quantities are imported from the ports in Bristol channel. The



markets have abundant supplies, and good water may be obtained from several convenient places. Fishguard is a creek of Cardigan.

Population in 1881, numbered 2,009.

**Soundings off Fishguard.**—Within the line of the inner part of Pen Anglas and Dinas head, no deeper water than 10 fathoms will be found, over a bottom of sand, mud, and broken shells; the depths are regular, slowly diminishing towards the coast, so that the lead will always be a sufficient guide while working, tacking generally in 5 fathoms. Outside the above line, less than 20 fathoms will be found for at least 2 or 3 miles, with sand, gravel, and shells; for as soon as Strumble head is passed to the eastward, deep water is only found at a distance off shore. While to the westward of Dinas head, however, it will be erring on the right side to keep in a depth of 30 fathoms, to insure a good offing at night.

**DINAS HEAD**, or Dinas island, as it is sometimes called by the coasters, is a remarkable headland, appearing from most directions wedge-shaped with its highest part (452 feet) towards the sea. It divides Fishguard and Newport bays from each other, and bears E. by S.  $\frac{3}{4}$  S., distant  $5\frac{1}{2}$  miles from Strumble head, and W. by S.  $\frac{1}{2}$  S.,  $8\frac{1}{2}$  miles from Kemmaes head. The hamlet and church of Dinas are just above high-water mark in Newport bay, at the eastern end of the low swamp which almost insulates the head.

Here, a safe little boat-harbour, conveniently situated for the few boats engaged during the herring season, is partly protected by some low-water rocks lying a short distance outside low-water mark.

**THE COAST**, from Dinas head to the entrance of the river Nevern, consists of slate rock in rapid decay, with numerous small quarries in constant work. There are no outlying dangers, so that attention to the lead is all that is necessary.

**NEWPORT BAY** is contained between Dinas head and Carreg Drewey, a small high-water rock connected to Pen-y-bal by a low-water ledge; it is about  $2\frac{1}{4}$  miles across, and one mile deep, and is clean throughout, with depths decreasing regularly from 9 fathoms to the shore. The ebb leaves uncovered a large tract of fine smooth hard sand at the entrance of the river Nevern, and which is safe for beaching. In fine weather, and with southerly or easterly winds, vessels may bring up in Newport bay to await the tide, but no dependence should be placed on it affording shelter in bad weather. Anchorage may be taken up in any part of the bay, over a bottom of blue clay coated by sand.

**River Nevern** has its outlet at the head of Newport bay, and is bounded by a rocky shore to the westward, and by Newport sands to the eastward, and, though at low-water it dwindles to a mere rill, it forms the

harbour of Newport. The channel is very tortuous, and the idea of cutting a more direct passage through the sands is not yet abandoned.

No stranger should attempt to enter the river without a pilot, who may be readily obtained, but even with one, entry, except in fine weather, is not a very safe operation, as a heavy sea frequently sets into the bay, and breaks furiously upon the sands. In the channel of the river, moreover, are some very awkward stones, which are dry at low-water, and it is, therefore, preferable to enter at high-water by crossing directly over the sands, and thus avoid the outer part of the channel. In ordinary springs, vessels drawing 12 and 13 feet may be admitted, and those of 6 and 7 feet draught at neaps. Being forced to run for the river in a case of extremity, beach on the western side of the sands, from whence vessels are more easily got into safety.

**TIDES.**—It is high-water, full and change, at Newport, at 7h.; springs rise 12 feet, neaps 9 feet.

**Newport** is a clean and regularly built town, on the southern side of the Nevern, and at the base of the bold rugged mountain Carningly peak; here are the ruins of a fine old baronial castle built in 1215. The town affords moderate supplies, and excellent water may be obtained from the stream Cwm-dwi, just on the west side of the entrance to the river, and from two other streams between the latter and Dinas head.

**A Rocket** apparatus is kept at the coast-guard station.

Newport exports slates, bark, and corn; and imports coal, culm, and limestone; it is a creek of Cardigan.

From Pen-y-bal to Kemmaes head the coast consists of slate, and is steep and high, and safe of approach in any part to the distance of half a mile. One and a half mile to the eastward of Pen-y-bal, and close within the cliffs, is the round-topped hill Foelgoch, the summit of which is 623 feet above the water.

**KEMMAES HEAD**, or Pen Kemmaes, a fine bold cape, with the land rising very steeply from the cliffs to the height of 580 feet, forms the western boundary of port Cardigan and of Cardigan bay.

To maintain a proper offing at night between Dinas and Kemmaes heads strangers are recommended, as a general rule, not to go within a depth of 22 or 23 fathoms, so as to insure the distance from the land being from 4 to 6 miles.

**Tidal Streams between Dinas Head and Kemmaes Head.**—There is but little tide stream in Newport bay, and that little is much influenced in its course by the sweep of the bay. Outside, the flood sets E. by S.  $\frac{1}{4}$  S., and at the distance of 3 miles from Dinas head it gradually draws more to the northward, as the distance from the shore is

increased. One mile from Pen-y-bal, the ebb sets W.  $\frac{1}{4}$  S., partly trending round Dinas head into Fishguard bay, but close inshore, it sweeps round Carreg Drewey into Newport bay. About 4 miles off Pen-y-bal, the general direction of the ebb is about W.  $\frac{1}{4}$  S., and for a mile or two off Kemmaes head it sets W.S.W., with an apparent indraft into the several bays. The velocity of the tides seldom exceeds  $1\frac{1}{2}$  to 2 knots at springs, while the offshore streams will be found to turn at very nearly 3 hours after high and low-water at Fishguard.

**LIGHT-VESSELS.**—The following regulations have been established respecting the several light-vessels under the jurisdiction of the Trinity House, London.

**Riding Lights.**—A *white* light is exhibited from the forestay of each light-vessel, at a height of six feet above the rail, for the purpose of showing in which direction the vessel is riding when at her station.

**Signals.**—When a light-vessel is driven from her proper position to one where she is of no use as a guide to shipping, the following signals will be made, viz. : The usual lights will not be exhibited, but a *fixed red* light will be exhibited at each end of the vessel, and a *red* flare shown *every quarter of an hour*. By day, the balls or other distinguishing mast-head marks will be struck. If from any cause the light-vessel be unable to exhibit her usual lights whilst at her station, the riding light only will be shown.

The firing special rockets (of little sound but of great brilliancy) immediately after a gun from a light-vessel will denote the need of assistance from the shore.

Vessels are liable to a penalty of 50*l.* for fouling a light-vessel or a buoy, in addition to the expenses of making good any damage so occasioned.

**WRECK-MARKING VESSELS.**—When a light-vessel or other craft is anchored to mark the position of a wreck, the top-sides are coloured green, and she exhibits—

**By day.**—Three balls from a yard 20 feet above the sea, two balls placed vertically on the side that shipping may safely pass, and one ball on the other side.

**By night.**—Three *fixed white* lights similarly arranged and with the same meaning, but the ordinary riding light is not shown.

Mariners will thus know on sighting a wreck-marking vessel that she is so employed, and that they should pass on that side of her on which the two balls or the two lights are shown.

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## CHAPTER II. CARDIGAN BAY.

KEMMAES HEAD TO BARDSEY ISLAND.

VARIATION IN 1884.

Aberystwith     "     "     "     "     "     20° 25' West

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**PORT CARDIGAN.\***—From Kemmaes head to Cardigan island is E. by N.,  $1\frac{1}{2}$  mile.

Port Cardigan is contained between these two points, and is one mile in depth to the low-water margin at its head; the depths in it are regular, gradually decreasing from 10 fathoms on the line between the points to the beach. The general character of the bottom is sand, except on the western side of the bay, where it is foul, but either shore may be safely approached to within one cable. At the head of the bay there is an extensive sand-bank, bounding the outlet of the river Teifi, in standing towards which the lead will be the best guide. Care must be observed not to proceed in too far for an anchorage; the best mark for this purpose is not to bring the two white houses of Cwbert, standing near the brink of the cliff on the east side of the bay, open to the southward of the point a little to the northward of those houses, and to keep either in the middle, or upon the east or west side of the bay, according to the wind. The bay, however, is not fit for a stopping-place in bad weather, as winds between north-west and north-east throw a heavy sea into it.

In communicating with the shore to obtain a pilot, and there are generally two or three on the look-out but who have no boats outside the bar, one or other of two landing-places may be used according to the wind; that on the eastern side of the bay is behind the rocks, close under Cwbert, and the other is upon the western side, under Penrhyn castle, a castellated house with a flagstaff. At the latter shore is a very small pier, with a beacon to mark its end when covered by the tide; but when there is any sea in, no landing can be effected here before half-flood, as the rocks outside the pier dry at low-water. In extremity it would be advisable to beach near this spot.

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\* See plan of port Cardigan, on Admiralty chart, Bristol channel to New Quay, No. 1,410.

**Cardigan Island**, which is elevated 175 feet, is less than half a mile long. At its western end there are some small rocks very close in, which may be avoided with common prudence. When the island is not shut in with the land, it serves as a good mark for the port, but at a distance off shore the best guide for being abreast port Cardigan is the mountain of Breninfawr (elevated 1,285 feet) bearing South. Another mark for this part of the coast, when within 5 miles of it, is the sharp pyramidal hill, 257 feet high, named the Mount, one mile and a half to the eastward of Cardigan island, but being lower than the back-land, it is not so conspicuous when abreast it. . . . .

Cardigan sound, the passage which separates the island from the main, is a very narrow channel, occasionally used by the coasters, notwithstanding some dangerous rocks on its south side, and there being only a depth of 12 feet in one part of it. The tides in it are rapid, and no stranger should attempt it.

**River Teifi**, or Teivy, the outlet of which forms the harbour of Cardigan, and the largest river which falls into Cardigan bay, rises in Llyn Teivy, a lake in Cardiganshire, a few miles from the source of the Towy, and, thence descending to the south-westward, reaches the vicinity of Tregaron. Below Lanio bridge it bounds the counties of Cardigan and Carmarthen, having on its right the town of Lampeter. At Llanfihangel-ar-Arth, the river bends towards the north-west, and having received many tributaries, is, as it approaches Newcastle Emlyn, confined within steep banks fringed with wood; a little beyond it is joined by the Kerry, and runs between Cardiganshire and Pembrokeshire. At Llechrhyd bridge it becomes tidal and navigable, and, as an expanded stream, flows below the town of Cardigan, where it is crossed by a bridge; 3 miles beyond which it enters the sea through a wide sand-encumbered estuary. The whole length of the river is about 53 miles.\*

**TIDES.**—It is high-water, full and change, at Cardigan bar, at about 7h. 1m.; springs rise 12 feet, neaps 9 feet, and neaps range 6 feet. At Cardigan bridge it is high-water at about the same time as at the bar, but the stream turns and runs down nearly 20 minutes before the tide has ceased rising, and earlier than if the freshes are strong.

**Directions for Cardigan Bar.**—At spring tides there is about 14 feet on the bar at high-water, but not more than 9 feet at neaps. There may be a foot or two greater depth within the bar, but at low-water there is not a boat passage for the whole way from Cardigan to Popit, 2 miles below.

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\* The lengths of rivers, and canals, and the distances by roads or railways, are given in statute miles.

The bar may be crossed in the deepest track with Cwbert houses and a farmhouse named Clun-Ynys, on the high back-ground, in line, bearing about N.E. by E.  $\frac{3}{4}$  E. as a cross-mark; and, as a leading-mark, the barrel-post beacon upon the western side of the channel, just open to the westward of Sandy point, terminating the sand-hills upon the eastern side, about S. by E.  $\frac{1}{4}$  E. Run in upon this latter line, and when the bar has been crossed, steer up for the beacon, which is to be left on the starboard hand. From Sandy point to Bryndu the channel is subject to considerable change; in December, 1881, it was near the eastern side of the river.

**Pilots.**—The pilot charges are moderate, and a pilot should always be taken before approaching the bar, as the entrance is very narrow and subject to change, and the banks in some parts are very steep; yet as a case of necessity might oblige a vessel to endeavour to cross the bar without such assistance, it is only prudent to furnish the foregoing directions. The best, indeed the only time for crossing the bar is during the last hour of flood, and even then, though the distance across it is not great, it is a critical operation in blowing weather.

**Pwll-Castell** is about midway between Pwll-gam and Cardigan, and one or two small vessels can lie afloat there at low-water, but the very strong tides render it a dangerous berth, and it is, besides, in the track of vessels going up and down.

**Life Boat.**—A life-boat is stationed near Penrhyn castle, upon the west side of the river, and rocket apparatus at St. Dogmaels.

**Cardigan** possesses considerable trade, it is situated upon the north bank of the river, and three-quarters of a mile below, on the opposite side, is St. Dogmaels, once famous for its abbey.

**Trade.**—The imports of the town chiefly consist of coal and some timber, and the exports of slates and agricultural produce. The custom-house returns in 1882 were as follows:—No. of vessels belonging to the port, 75=3,709 tons. Coasters, inwards, 839=29,500 tons; outwards, 798=28,113 tons: Foreign, inwards, 2=438 tons.

The population in 1881 was 3,633.

**Traeth Mount.**—The remarkable peak  $1\frac{1}{2}$  mile to the eastward of Cardigan island, and already alluded to, has within it a small snug nook, with a sandy beach, called Traeth mount, which offers a convenient smooth-water landing-place with winds to the southward or eastward.

**PEN CRIBACH.**—Three miles farther to the eastward is Pen Cribach, a bald table headland, from whence the course to New Quay is E.  $\frac{3}{4}$  N., 9 miles.

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**ABERPORTH.**—There are three small places in the succeeding portion of coast, where coal and limestone are occasionally discharged, but neither of them affords the least shelter. The first is Aberporth, a fishing village just to the south-eastward of Pen Cribach, and its little bay derives some protection from that head in westerly winds. The second is Llangranwg, three-quarters of a mile to the south-west of Llochtyn ridge, and the third, Cwm Tydi, about midway between Llochtyn and New Quay.

**YNYS FACH.**—A long and remarkable ridge of rock terminating in Llochtyn point, or rather in a rock called Ynys Fach, projects from the coast about  $4\frac{1}{4}$  miles to the eastward of Pen Cribach, forming on its eastern side a little bay where small vessels may lie for a tide in fine weather and off-shore winds, but a heavy sea quickly rolls in upon a change occurring.

Moel Badell, a very remarkable hill just above the point, resembling an inverted pan, as its name implies, serves as a good land-mark from the eastward.

Although there is no known danger near the shore, and therefore nothing to prevent vessels standing in, if desirable, still it may be observed that, between Pen Cribach and New Quay head, the depths are very irregular. N.  $\frac{3}{4}$  E. and N.E.  $\frac{1}{2}$  N. from Llochtyn ridge, at 3 and 2 miles off, are two small banks having  $9\frac{1}{2}$  and 9 fathoms upon them, with 13 and 14 fathoms, over soft mud, between them and New Quay, while there is but 11 fathoms, sand, 8 miles from the land, with New Quay head bearing south.

**NEW QUAY HEAD** is the first conspicuous cape after passing Kemmaes head, and it may be known by a single windmill on the high ground about  $\frac{3}{4}$  of a mile from the coast. There are no off-lying dangers, and the shore, with its high rugged face, and two large rocks in front of it close to the head, may be freely approached. The easternmost of these rocks, named Carreg Waltog, is insulated, and the other and larger, Carreg Drenog, is joined to the land by a low isthmus, and is a remarkable object when seen from the eastward or westward.\*

**New Quay Bay** may be considered safe for vessels in winds from west, through south, to north-east, but if to the northward of west such a heavy sea rolls in that it would be exceedingly dangerous, if not impracticable, for vessels to ride there. Those, therefore, bound to Cardigan bay should not reckon upon this place for refuge in bad weather, for a sudden

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\* See Admiralty charts, England, west coast, New Quay to Holyhead, No 1,411; scale,  $m=0.5$  inch; also, Gynfelin patches, Aberystwith, and New Quay bay, No. 1,486; scale  $m=3.0$  inches.

shift of wind to the westward or northward, which not unfrequently occurs, would place a vessel in a most perilous situation.

**Carreg Ina.**—There is much foul ground in New Quay bay, but nothing dangerous except the rocks called Carreg Ina, which, forming the eastern horn of the bay, and uncovering at 4 hours ebb ordinary springs, stretch off for about 3 cables from the low point of Ina. They are marked on the north-west side by a *red* buoy in about 2 fathoms at low-water, and will be cleared to the northward, with Waltog rock open of the head, or kept in such a position that the narrow channel between it and the head may be distinctly seen; and to the westward, when the three limekilns to the eastward of Ina point are shut in upon that point. At night, a vessel must keep within the limit of the *white* light from the pier-head.

**Anchorage.**—In proceeding for the anchorage in New Quay bay, which is to the south-eastward of the head, the latter may be rounded pretty closely, or at a moderate berth. Bring the coast-guard (*white*) watch-house, on Pen-y-wig point, near the heel of the pier, in line under Llanllwchaearn church, standing in the valley within New Quay, and Waltog rock touching the inner point of the head; these marks point out the best position for anchoring in  $2\frac{1}{2}$  fathoms at low-water, over sand.

**TIDES.**—It is high-water, full and change, at New Quay, at 7h. 30m.; springs rise 15 feet. The streams in New Quay bay are regular, and of little strength, as the rate does not exceed one mile an hour at springs. Close in-shore they follow the sweep of the coast, but outside of Carreg Ina the flood sets about south-west and the ebb north-east.

**NEW QUAY Piers and LIGHT.**—A pier projects from Pen-y-wig point, curving in a general E. by S. direction for about 500 feet, with a small lighthouse at its outer end. The space within is all dry at low-water, and the soil is sand and clay; vessels drawing 15 feet may enter at springs, and those of 9 feet at neaps. The vessels lie with their sterns towards the pier and with anchors out ahead, and it affords very poor shelter to the numerous vessels belonging to the place, which range from 60 to 500 tons; the heaviest run into the harbour occurs in north and north-west gales. The light, which is 31 feet above high-water, is exhibited from the 15th of September to the 12th of March; it shows *white* seaward round to its bearing W.  $\frac{1}{2}$  S., and *red* from thence to the shore, covering Carreg Ina rocks.

About 300 yards to the southward of Pen-y-wig, a stone pier extends from the shore in an E. by S. direction, within which is a patent slip capable of taking up vessels of 550 tons.

**Life-Boat, &c.**—A life-boat is stationed a little within the latter pier, and life-saving apparatus is stored at the coast-guard house.



New Quay is frequented as a bathing place; its herring fishery is considerable, and it has imports of timber, coal, culm, and limestone.

The population of New Quay was in 1881, 1,328.

**COAST.**—From New Quay head the coast, after passing New Quay bay, again trends easterly and northerly, and to as far as Aberaeron consists generally of perpendicular slate cliffs varying in height from 20 to 120 feet, from whence the back-land suddenly rises to 200 feet, or thereabouts.

**Carreg Gloyn.**—Patches of foul ground with 5 or 6 feet over them at low-water, stretch out generally about 2 cables from the shore to as far as Pen-y-gloyn point, where is a depth of only 9 feet one-quarter of a mile off. Besides which, Carreg Gloyn, a sunken rock with only one foot over it at low-water spring tides, is W.  $\frac{1}{4}$  N., half a mile from Aberaeron pier, and vessels should therefore be careful when approaching that port from the southward. The mark for clearing the rock is Penrhiw farm-house in line with Aberaeron school-house, which is a small but conspicuous building with a belfry on its south gable, standing near the shore a little to the eastward of the north pier, and close to a row of cottages. Penrhiw is a remarkable looking white farm-house on the summit of the high land a quarter of a mile back from the sea, and nearly half a mile to the eastward of the little village of Aberarth, and, as there is no other house near it, it cannot easily be mistaken. The tower of Llan-ddewi church, kept open of an intervening brow, bearing about E.S.E., is also a good mark for clearing the Carreg Gloyn.

**Aberaeron** village, East, 4 miles from New Quay head, has a small pier-harbour suited only to the coasting trade, and not to be attempted by strangers. The harbour is formed by the outlet of the Aeron, a small stream, the channel of which is fixed and defended by north and south piers, the south pier overlapping the northern one, the direction in between them being about S.E. by S. The entrance is encumbered by shingle, to turn which groynes are formed east and west of the piers, but there is no bar, properly speaking, for accumulations are quickly cleared away upon the occurrence of a fresh. Vessels drawing 8 and 9 feet may be admitted on springs, and those of 5 and 6 feet draft on neaps.

Pilots are always in attendance, and, as their assistance is absolutely necessary to strangers, it will only be remarked here that if bound to the harbour from the northward, the toll-house is to be kept open of the pier-head. This house is the southernmost one in the village, detached, and standing at the south end of a row of small cottages upon the face of the hill. When the wind blows hard from the north-west there is but little shelter at high-water within the piers, the run being so great as to render the securing of vessels all but impracticable. Limestone heaps are also

scattered about the channel and along the inner face of the south pier in such a way as to be dangerous to vessels entering. Two solid wood buoys mark either side of the fairway of the entrance, and, during the herring season, two lanterns, to be kept in line, are held in readiness to be shown at tide-time.

There is no anchorage near Aberaeron within one mile of the shore, as the bottom of the frontage consists of foul ground with large stones, in which vessels' anchors will not hold, even with moderate off-shore winds. Between one and two miles off-shore there is good anchorage in 9 to 12 fathoms, over sand, but it is of course unsheltered.

Shipbuilding and shipping repairs are carried on at Aberaeron to a moderate extent; the water of the river is good for use; corn and potatoes are exported, and coal, culm, limestone, and timber are imported. Aberaeron is a creek of Aberystwith.

**COAST.**—From Aberaeron, the coast trends easterly, and continues of the same character to Aberarth, a small village without a church, and with some limekilns on the shore abreast; it offers no shelter for boats. Afterwards the shore becomes rocky and steep-to, the cliffs varying from 60 to 70 feet in height, and the back land rising to 200 feet above them; the bold shore continues for another mile and a half, and then becomes flat and low to Pen Pygyn, the high ground receding from the coast for half a mile.

Between Aberarth and Pen Pygyn are the two small villages of Llan-santffraid and Llanrhystyd, the former with a tower, and the latter with a spire church; both stand low, and are not conspicuous from the sea.

The more prominent objects upon the coast between New Quay head and Pen Pygyn are the windmill, the two meeting-houses, and Pystyll and Pewshiw farm-houses on the high land, and the small churches of Hen-fynyw standing half a mile back from the coast about one mile south-west from Aberaeron. In addition are Llan-ddewi church on the high land, and Penrhiw farm-house, just where the high land terminates about half a mile to the eastward of the village of Aberarth.

**CADWGAN REEF.**—Rather more than 4 miles N.E. by E.  $\frac{1}{3}$  E. from Aberaeron piers is a shoal projection called the Cadwgan, the outer edge of which is half a mile from the shore, with not more than 8 feet over it at low-water springs, and with a depth of 16 feet upon it before any vessel could attempt Aberaeron harbour, but as it frequently causes a heavy sea it should be avoided. To clear it, keep Pystyll farm-house, one mile south of New Quay head, and just to the westward of the highest rounded hill upon the outline, open to the westward of the point of Ina, bearing S.W. by W.  $\frac{1}{4}$  W.; but as the low point can seldom be made out distinctly,

a better mark is to keep Moel Badell, in line with Drenog rock, W.S.W. (View J., chart 1,411).

Pen Pygyn, a clifty headland, bears from New Quay head E. by N.  $\frac{1}{4}$  N. 10 miles, but a vessel leaving New Quay should not steer to the eastward of N.E. by E.  $\frac{3}{4}$  E. in order to pass one mile outside Cadwgan reef, and the appearance of the land about New Quay while upon this course is shown in the view above referred to. The point just appearing clear of the head and over the large rock Drenog is the conspicuous hill of Moel Badell.

Strangers should be cautious how they approach the land between Aberaeron and Pen Pygyn, as numerous shoal patches of stones stretch off for a half or three-quarters of a mile. No anchorage or shelter can be found within these limits, even with the wind off-shore.

**PEN-Y-DINAS.\***—Castle point at Aberystwith bears N.E.  $\frac{1}{4}$  N. about  $6\frac{1}{4}$  miles from Pen Pygyn, and the coast is one continued cliff, and unapproachable until within one mile of that town, when it sinks to a low shingle beach, through which the rivers Rheidol and Ystwith find their outlet. The curious hill, Pen-y-Dinas, standing detached from the adjacent high ground, rises above the right bank of the latter stream; it has a monument on its summit, and from being so near the coast is a very useful sea-mark. The eastern side of the hill shelves down to the Rheidol, at the junction of which with the Ystwith, the united rivers turn short to seaward, and form the entrance of the harbour of Aberystwith, half a mile to the southward of Castle point.

**Approach to Aberystwith.**—Supposing a vessel to be one mile N.W. from Pen Pygyn and bound to Aberystwith, the depth would be 7 fathoms, stony ground, and the course N.E.  $\frac{1}{2}$  E., but, as the ebb tide, from being upon the port bow, is apt to set a vessel in-shore, and as there are some shoal patches off the low part of the coast, the farm-house of Penglais should always be kept in sight to the westward of the main part of Aberystwith castle. The above farm-house stands on the high ground above Craig Lais, and is the nearest farm-house to the coast; it is white, with a single chimney on its northern or sea gable.

There is also some shoal ground off Morfa, but by keeping Moel Badell well open of New Quay head, about S.W. by W.  $\frac{3}{4}$  W., it will be avoided.

A vessel bound to Aberystwith, pursuing a N.E. by E.  $\frac{3}{4}$  E. course from the neighbourhood of New Quay, will have from 10 to 12 fathoms water, mostly over a muddy bottom, until within 3 or 4 miles of the castle, when the depths will decrease gradually to 6 fathoms over stones and sand. But in this course some allowance must be made for the tides, which,

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\* See Admiralty chart of Gynfelin patches, Aberystwith, and New Quay bay, No. 1,486; scale,  $m = 3.0$  inches.

though not strong even at springs, have, both flood and ebb, a tendency to set her in-shore. If the wind should be from the north-east, and the vessel have to beat up at night, the lead must be kept steadily going, and the following observations will be of use.

**Trawling Ground.**—In standing off, a depth of 11 or 12 fathoms, sand, will be found at 10 miles from the land, and on returning in-shore the depth will slowly decrease to 9 and 8 fathoms. Afterwards, at 2 or 3 miles off-shore, the depths will increase to 11, 12, and 13 fathoms while crossing a long and narrow trough or channel with muddy bottom, and which, lying nearly parallel with the course of the shore, is a good trawling ground. Farther in, the water will quickly shoal to 9 and 8 fathoms, over stones, when it will be fully time to tack. This muddy hollow continues until within 3 miles of Aberystwith, and the seaman must then use his own judgment in determining his course till daylight, but he should be aware that, if he have stony bottom when standing outwards from the trawling ground, it is probable that the vessel is approaching Gynfelin patches.

**Rivers Rheidol and Ystwith.**—The Rheidol has its source upon the western side of the Plinlimmon mountains. After a progress of some miles between precipitous rocks, and passing under Devil's bridge, there is a waterfall at the junction of the waters with the Rhyddnant; from the confluence of the Rhyddnant, the Rheidol changes its course from south to west, flowing as a broader and more tranquil stream; and passing the church of Bangor, and by Llanbadarn on the south, it enters the sea at Aberystwith, after a course of 25 miles; on the south side of the town it is crossed by a bridge, and at about 250 yards above by the southern line of railway to Milford.

The Ystwith rises on the borders of Montgomeryshire, south-east of the Rheidol, and flowing south of Eglwys-newydd and Pont Llanafan, curves round towards the north-west. It afterwards flows northwards of Llan Ilar and under Pont Llanychaiarn, and, winding round the base of Pen-y-Dinas, effects a junction with the Rheidol, at the harbour of Aberystwith, after a course of about 20 miles. The Ystwith is also crossed near the pier by a cart bridge, the railway passing along its eastern bank.

**ABERYSTWITH ROAD.**—The best anchorage for vessels waiting tide to enter Aberystwith harbour, is with the main part of the castle ruin in line with the south-west detached, and lower, part of the same ruin; and the south-east or inner brow of the steep and conspicuous hill of Clarach in line with Carreg Fulfran. With these marks, there will be a depth of 5 fathoms over sand and clay.

Should it be necessary to communicate with the shore while blowing hard, the best half-tide or low-water landing-place is the beach fronting the parade at the north-east end of the town, keeping as close to the rocks from the castle as may be prudent.

**ABERYSTWITH**, advantageously situated at the lower end of the vale of Rheidol, near the confluence of the Rheidol and Ystwith, is a well-known resort of sea-bathers, and presents a pleasing appearance from the sea. Among its more prominent objects are the ruins of its castle, occupying the summit of a low promontory at the west end of the town, and the monument on Pen-y-Dinas hill, already mentioned, over the river, south of the town.

**Harbour.**—The outlet of the united rivers, which forms the entrance to Aberystwith harbour, is defended south-westerly by a pier 260 yards long, extending in a N.N.W.  $\frac{1}{2}$  W. direction.

The harbour should not be attempted by strangers, except in extremity, for the channel in is narrow and turns sharply, and freshes at times materially increase the difficulty of entering. A ridge of rocks also extends south-west from Castle point; these will, however, be cleared with Pen-y-Dinas monument, in one with Harbour point, bearing S. by E.  $\frac{1}{4}$  E., and pilots with boats and warps are constantly ready at tide-time. The harbour, with a bottom of gravel, is nearly dry at low-water springs, but vessels drawing 14 feet can enter it, during fine weather, at high-water springs, and those of 10 feet on neaps; but it must be remembered that the depth is rather uncertain, owing to the westerly exposure of the harbour and the shifting character of its bar, which is composed of shingle.

**LIGHTS.**—A *fixed* light is exhibited from near the pier-head, which shows *red* to vessels running up for the harbour from the southward and westward, to distinguish it from the town and bridge lights; but appears *white* as usual to ships approaching from W.N.W. and N.N.E. directions. In a green sloping field just above the heel of the pier are two shifting white boards which lead in when kept in line. When there is a proper depth of water in, a *red* flag is hoisted at the pier flagstaff; and, if a vessel should be off the harbour at dusk, *white* lights are shown at tide-time from the boards above mentioned.

A vessel in extremity and unable to enter the harbour should endeavour to beach opposite the parade at the north-east end of the town.

**TIDES.**—The streams off Aberystwith are not strong, seldom running at a greater rate than half a knot. It is high-water in the harbour, full and change, at 7h. 30m.; springs rise  $13\frac{1}{2}$  feet, neaps 10 feet.

**Life-Boat.**—A life-boat is stationed north of the harbour.

Ship-building is carried on at Aberystwith, and there are foundries in which repairs of machinery may be effected. General supplies may also be obtained, and good water from the channel of the Ystwith. Steam communication is kept up with Liverpool, Bristol, and the intermediate ports. The chief imports are coal, culm, limestone, and timber; and the exports, bark and lead ore. Aberystwith is in connection with the general lines of railway, both north and south.

**Trade.**—The custom-house returns in 1882 were as follows:—Number of vessels belonging to the port, 223=29,933 tons. Coasters, inwards, 373=27,401 tons; outwards, 361=25,441 tons; foreign, inwards, 4=966 tons; outwards, 4=833 tons.

The population in 1881 was 6,664.

**Pen Cwningen.**—Rocky prongs uncovering towards low-water stretch out south-westerly and north-westerly from Castle point, in the former case for  $1\frac{1}{2}$  cable, and in the latter case for nearly a cable. Pen Cwningen, the north-western extremity, as well as the others, may be cleared by keeping all the farm-houses on the face of Clarach hill open to the northward of a conspicuous sugar-loaf rock, Carreg Fulfran, lying at the foot of Craig Lais. This rock stands up 20 feet at least above high-water, and the houses should be kept open of it until Pen-y-Dinas monument has been brought in line over the high-water shingle point, as before mentioned.

**CLARACH PATCH.**—From Castle point it is N. E.  $\frac{1}{2}$  N., rather less than 4 miles to Borth point, and, with the exception of the low and marshy vale of Clarach, the coast is bold and rocky, consisting of cliffs from 20 to 120 feet high. Besides the great reef, the Sarn Gynfelin, which projects from the coast in this interval, there is a shoal patch of foul ground, the Clarach, stretching off for half a mile from the foot of the cliffs on the north side of the vale of Clarach. As there is a depth of only 2 feet over it at low-water springs, small coasters and boats passing between Aberystwith and Aberdovey with a falling tide should not shut in the north end of the low cliff at Alltwn upon the outer part of Pen Cwningen. When the whole of the rocks of Pen Cwningen are covered, a vessel drawing 6 feet may safely bring the low part of the cliff at Alltwn in line with Castle point.

**GYNFELIN PATCHES.**—Two miles and a quarter to the northward of Aberystwith, that extraordinary and dangerous shoal named the Sarn Gynfelin, or Gynfelin patches, begins at the gorge of a deep ravine abreast the farm-house of Wallog, where formerly was a lead-smelting establishment. It begins as a narrow tongue of shingle and pebbles intermixed with large stones, named Sarn Wallog, which stretches out in a N. W. by W.  $\frac{1}{4}$  W. direction, and dries at spring tides for the distance of

half a mile, but is covered throughout its whole extent when the water has risen from 6 to 8 feet. For the next 2 miles it is known as the Sarn Gynfelin, and farther out as Gynfelin patches to the distance of 6 miles, when it suddenly terminates.

**Inner Channel.**—From the outer low-water extreme of the Sarn Wallog, the shallow continues in about the same direction, with one to  $1\frac{1}{2}$  fathom over it at low-water, to the distance of rather more than  $1\frac{1}{2}$  mile from the shore, where it deepens to 2 and  $2\frac{1}{2}$  fathoms, forming an inner swashway half a mile wide. The mark for running through this channel is the monument on Pen-y-Dinas, in line with the main part of the ruin of Aberystwith castle, bearing S.  $\frac{1}{2}$  E. (View E., chart 1,411).

**Main Channel.**—Westward of the inner channel, the Sarn again rises in two patches of  $1\frac{1}{2}$  and  $1\frac{3}{4}$  fathom, and at  $2\frac{1}{2}$  miles from the shore again becomes lower, deepening to 2 and 3 fathoms. In this, the main channel, the breadth from the patches just mentioned, to the inner end of another small shoal patch, is one mile, and the depth from 2 to 5 fathoms at low-water springs. The latter depth is upon its western side, for which there is no good mark, but a small white farm-house named Twilcurdotin, standing on the side of a hill to the south-eastward of Pen-y-Dinas, and about one-third of a mile from the hamlet near the toll-gate, open just to the eastward of Aberystwith castle ruins, S.S.E.  $\frac{1}{2}$  E. (View F., chart 1,411), will lead through on the eastern side in not less than 2 fathoms. This is a very distinct mark, for neither the toll-house nor any other building near Twilcurdotin can be brought in line with the castle ruin, as the hill of Pen-y-Dinas intervenes in all other cases.

**Patches.**—Upon the inner or eastern end of Gynfelin patches, there is not more than from 2 to 4 feet of water, but half a mile farther the depth increases to  $1\frac{1}{2}$  or  $1\frac{3}{4}$  fathom, and so, as a narrow ledge, it continues for nearly one mile, where occurs another swashway, but too narrow and too close to the dry stones of the Outer patch to render it a safe channel.

Two-thirds of a mile S. by W. from the eastern end of the Patches is a narrow ridge of stones, extending south-west for more than one-third of a mile, with  $2\frac{1}{2}$  fathoms over it.

**Outer or large patch.**—At the eastern end of this are three stones of immense size. One of them, steep and smaller at the base than on its upper side, and measuring from 15 to 20 feet across, has quite the appearance of being a mass of ruin. Two of them show their heads at low-water spring tides, and they bear from New Quay head, N.E.  $\frac{1}{4}$  N., 14 miles; from Aberaeron, N.N.E.  $\frac{3}{4}$  E.,  $11\frac{1}{2}$  miles; and from Aberystwith castle point, N.W.  $\frac{3}{4}$  W., 5 miles.

The outer patch resembles a pear in shape, with its broad end towards Aberystwith, in a N.W.  $\frac{1}{2}$  W. and S.E.  $\frac{1}{2}$  E. direction; it is  $1\frac{1}{2}$  mile long,

and one mile wide, between the 3-fathoms boundary. About the middle, and towards the western end of this great patch there is a depth of 3 and 4 feet at low-water springs, and over the extent of  $1\frac{1}{2}$  mile the depth is only 9 feet, but the extremity of the bank falls quickly into 5 and 7 fathoms.

**Buoy.**—A conical buoy, marked *Patches*, and *striped horizontally black and white*, lies in  $4\frac{1}{2}$  fathoms outside the outer patch; with Aberystwith church, just open to the northward of a high house in front of it, bearing S.E. by E.; and the cliffs south of Barmouth, in line between the second and third summits of the mountain range at the back of that place, N.E.; also, upon the following bearings:— From New Quay head, N.E.  $\frac{1}{2}$  N., distant  $13\frac{1}{2}$  miles; from Aberaeron, N.N.E.  $\frac{1}{4}$  E.,  $11\frac{1}{2}$  miles; from Aberystwith castle, N.W. by W.,  $6\frac{2}{10}$  miles; from Wallog farmhouse, W. by N.  $\frac{1}{4}$  N,  $6\frac{3}{8}$  miles; from Aberdovey buoy, W.S.W.,  $8\frac{1}{2}$  miles; from the buoy of Sarn-y-Bwch, S.W. by S.,  $9\frac{1}{2}$  miles; from Sarn Badrig perch buoy, South,  $16\frac{1}{2}$  miles; and E. by S.  $\frac{3}{4}$  S., 28 miles from Cardigan bay light-vessel.

**General Directions.**—This great shoal projects so far from the shore that it is difficult to supply good marks for avoiding it, should the buoy be adrift. To the southward of Aberystwith town and over the side of its harbour, appearing between the castle and Pen-y-Dinas, is a tall chimney, which once formed part of a smelting establishment, and  $2\frac{1}{2}$  miles from that chimney, the small rounded hill of Troed, though overtopped by the backland, shows plainly behind Pen-y-Dinas; these two objects in line, bearing S.E. by E.  $\frac{3}{4}$  E. (View H., chart 1,411), will lead to the southward of the outer patch in  $4\frac{1}{2}$  fathoms at low-water. Troed hill may also be known from a hedge which nearly bisects it.

To clear the northern side of the shoal, trace the outline of the high land from Aberdovey southward to the culminating point, which is the mountain of Moel Llyn, with two summits, and a cairn, or pile of stones upon each. The northernmost of these cairns brought over Borth point, bearing E.  $\frac{3}{4}$  S., (View G., chart 1,411) will lead half a mile to the northward of the outer patch in 5 fathoms at low-water.

To clear the outer patch to the westward, only very distant land, and that but seldom seen, is available, but the following mark is better than none. The mountain of Cader Idris with its peculiar rocky summit, in an E.N.E. direction, is scarcely to be mistaken. Move the eye from it along the elevated range till four remarkable mountains to the northward of Barmouth are identified; the second of these from the southward must never be shut in behind the coast to the south-westward of Barmouth; when just open, bearing about N.E.  $\frac{1}{4}$  E. (View I., chart 1,411), it will lead nearly 2 miles outside of all, in 9 or 10 fathoms, over a rough stony bottom.

In the neighbourhood of this long reef of rocks, stones, and sand, the armed lead should be kept constantly going, and though no distinct direc-



tions connected with the depths and quality of the ground can be given, the seaman must be cautious in coming from the southward in misty weather, and with marks obscured, not to approach it at the period of low-water into a less depth than 7 fathoms. It is necessary also to bear in mind that, as upon the north and south sides of the shoal, a stony bottom will generally indicate its proximity, the first cast of that character should induce extra caution, especially upon the north side, where there is 7 fathoms within a ship's length of the shoal in some places; with a stony cast, therefore, tack instantly. At a little distance to the northward of Gynfelin Patches and the Sarn Gynfelin, in what may be called Aberdovey bay, the depths are regular over a bottom of sand, but farther out, and for a considerable distance round the outer patch, stones and sand alternate with such irregularity, that the nature of the bottom serves but little purpose in determining the position; the seaman, therefore, in endeavouring to trace these changes in the chart, must principally rely upon unceasing vigilance while in a vicinity so full of danger. No consideration should tempt him to allow his vessel in any weather to fall into this part of Cardigan bay, for as the wind frequently flies round to West and W.N.W., bringing in a heavy sea, with the Gynfelin Patches on one bow, and Sarn Badrig on the other, escape on either tack would be next to impossible.

**Gynfelin Tidal Streams.**—As the tidal streams are not strong in the vicinity of the Gynfelin, there is, consequently, no overfall upon it, but in fine weather they cause a ripple throughout its whole extent, a warning of which timely notice should be given from the mast head.

The streams having no great velocity in this part of Cardigan bay, the springs only running one knot, and the neaps half that rate, their direction is uncertain, but appears to be influenced by the Patches. To the southward of the Patches the flood was found to set about east, whereas outside and to the northward of them, it varied from N. by E. to N.E.

Upon approaching the shore to the northward of the Sarn Gynfelin, the flood will be found to have a northerly direction, and for some distance from the main channel it continues N.E. by N. At the fairway buoy of the entrance to Aberdovey harbour, its course is about north, and following the direction of the coast, it sets over the Sarn-y-Bwch, and from thence into Barmouth bay. The ebb stream may be said to have a general south-west direction both in Aberdovey bay and near the Patches, and, whether outside the shoal, or inshore and to the southward of it, it continues south-west to near New Quay, when it sets nearly west, and the flood east.

The ebb stream generally runs for two hours after low-water by the shore, but for an hour and a half only near the Patches. The flood stream

generally turns two and half hours after high-water by the shore, except just inside and to the northward of the Patches, where it continues but two hours after the shore high-water.

**CARDIGAN BAY LIGHT-VESSEL.\***—Since 1860, a light-vessel has been moored in 35 fathoms, near a central position of Cardigan bay, in lat.  $52^{\circ} 24' 30''$  N., long  $5^{\circ} 0' 30''$  W. The light, which is shown at 37 feet above the water, is *red, revolves every thirty seconds*, and in clear weather may be seen about 10 miles off. The vessel is painted red, and carries a ball at the mast-head by day.

**Fog Signal.**—A gong is sounded during thick or foggy weather. The light-vessel bears from St. David head, N.E., 32 miles; from the Smalls lighthouse, N.E.  $\frac{3}{4}$  E.,  $48\frac{1}{2}$  miles; from the Tuskar, E.  $\frac{3}{4}$  S.,  $46\frac{1}{2}$  miles; from Bardsey lighthouse, S.W.  $\frac{1}{4}$  S., 22 miles; from St. Tudwall west island, S.W. by W.  $\frac{1}{4}$  W.,  $30\frac{1}{2}$  miles; from New Quay head, N.W.  $\frac{1}{4}$  N.,  $26\frac{1}{2}$  miles; from Kemmaes head, N.  $\frac{3}{4}$  W.,  $19\frac{1}{2}$  miles; and from Strumble head, N.N.E.  $\frac{1}{4}$  E.,  $22\frac{1}{2}$  miles.

**BORTH POINT, &c.**—From Borth point, or Craig-y-Wilfa, the coast, after falling in to the eastward for about a quarter of a mile, thus forming a small headland, turns abruptly to the N.N.E., and shingle and sand bound the extensive morass Cors Fochno. The high land, leaving the coast at Borth point, takes an easterly direction and skirts the morass on its south side, while the latter forms the southern boundary of the river Dovey for the last 5 miles of its course.

The low sand point upon the south side of the entrance to the Dovey is 3 miles from Borth point, near to which, upon the side of the hill, is the village of Borth, a conspicuous object from the sea, while a street of low cottages skirts the coast for nearly a mile. The low-water shore north-north-east from Borth point is fine hard sand, averaging a quarter of a mile in breadth, and having its surface interspersed with roots of trees, the remains of an ancient forest.

**RIVER DOVEY**, or Dyfi, issuing at Aberdovey, and having its origin in a mountain lake on the east side of Arran Mowddwy, elevated 2,972 feet, passes through a wild and rocky mountain region to the village of Llan-y-Mowddwy and Dynas Mowddwy, and, on by mountains less precipitous, past Aberangel to the village of Cemmes; where, besides several other tributaries, it is joined by the Twymyn, and flowing through a pleasant valley and round Dinas rock, reaches Machynlleth, the capital of western Montgomeryshire. Near it, the Dovey is joined by the Dulas from the north, and farther on, from the south-east, by the Llymant; then,

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\* See Regulations respecting light-vessels, and vessels for marking wrecks, at page 80.

as an enlarged stream, it flows under the little trading village of Garreg, and, sweeping round a headland, becomes an estuary broad and straight, and joins Cardigan bay below Aberdovey. The total length of the river is about 30 miles, of which it is navigable for about 12 miles from its mouth.

**ABERDOVEY HARBOUR.**—The estuary of the Dovey has a considerable expanse at high-water, being one mile wide at its entrance,  $1\frac{1}{2}$  mile in width farther in, and it ends at 5 miles from the sea. The estuary is bounded on its northern side by rugged uncultivated hills rising steeply to the height of 900 feet; and the whole of it, at low-water, is one mass of sand, only excepting the narrow and winding channel of the Dovey, and the small lateral streams which convey the drainage.\*

The outlet of the river forms the harbour of Aberdovey, and though not available till the last-quarter flood, there being not more than 2 or 3 feet over its bar at low-water springs, it may nevertheless be considered a good harbour. Vessels lie abreast the village of Aberdovey, on the north side of the river, about one mile from the outer point, and half a mile farther from the bar.

At low-water, the two nearly parallel banks of sand forming the river outlet dry in places to the height of 13 feet, leaving a channel which had, in 1875, about an E.  $\frac{1}{2}$  S. direction for the town, and only one cable wide, between them; but its direction can never be depended on for any length of time, as in 1869, and again in 1874,† it trended in from the south-westward. Abreast the village, and northward of a stony point called Cerig-y-Pentwyn, is a pool with from 2 to 6 fathoms in it.

**Bar and Buoyage.**—As the bar, at the outer part of the dry sands, frequently alters in direction and depth, the buoys are shifted to mark the changes. There is an outer buoy, *striped horizontally black and white*, a small *red* buoy at the north edge of the south spit, and an inner buoy painted *red*, the former to be left on the port hand, and the two latter upon the starboard hand, entering. The outer buoy lies in 14 feet water, outside the bar, and the *red* inner buoy a short distance within the spit.

**TIDES.**—It is high-water, full and change, at Aberdovey, at 8 o'clock; ordinary springs rise 15 feet abreast the town.

In addition to the previous remarks about the tidal sets, it is necessary to state that at the *red* inner buoy the ebb stream continues for nearly an hour after it is low-water by the shore, and varies in rate from 3 to 4 knots, according to the amount of fresh in the river. The flood

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\* See Admiralty plan of Aberdovey, No. 1,487; scale,  $m = 4.0$  inches.

† Information from the buoy keeper, Aberdovey.

stream turns at the time of high-water by the shore, and is much weaker than the ebb, which on the average lasts  $7\frac{1}{2}$  hours, while the flood is seldom felt for more than  $4\frac{1}{2}$  hours. At the outer buoy, the flood stream may be said never to trend towards the river, its general direction being about north, with a rate of not more than three-quarters of a knot; whereas the main stream of ebb sets S.W. by W. and is always stronger than the flood.

**Directions.**—A vessel waiting tide may anchor anywhere off the harbour's mouth, as the ground is clear.

In entering the Dovey great attention to the tides is needed, as they set obliquely across the channel. During the second-quarter flood, for instance, the stream sets about E.N.E., and after half-flood, when vessels of draft may first venture in, about N.E. by E.; but towards high-water, when the banks are nearly covered, the stream sets about N.N.E., or directly upon the north sands. At half a mile within the bar, however, the flood takes a more direct course up the river, and it is only necessary to attend to the proper marks to fetch the anchorage. Unless there is a strong leading wind, vessels should enter the river at such a time as to insure reaching their berths before the ebb makes against them, as, should there be any fresh, it would be found very difficult to make head against it. Should such a case occur the tide will be found less rapid along the southern bank, as the junction of the river Lery with the main stream causes an eddy, and has the effect of deflecting their united waters over towards the north side.

Owing to the peculiarity of the flood set above described, it is better with scant southerly winds to keep well to windward, and under general circumstances it is safer to borrow upon the southern side.

Approaching from the southward the shore must not be closed nearer than to have Pen-y-Dinas monument just appearing clear of Craig Lais, bearing about S. by W.  $\frac{1}{2}$  W., a mark almost always visible, and which will clear Aberdovey sand-heads, and lead towards the outer buoy; or, if approaching from a direction more abreast, the buoy will be picked up by keeping the middle of Aberdovey village bearing about East. The course afterwards must entirely depend on the positions of the buoys and the directions of the pilots, as any instructions founded upon information, now correct, might in a very short time only mislead.

Frongoch point, open a little of Trefrydd point, bearing E.  $\frac{1}{4}$  S. (View D., chart 1,411), will lead to the anchorage in the pool abreast the gravel point of Cerig-y-Pentwyn, with the tower of Aberdovey church, under a conspicuous white house standing well up the hill behind the village, about N.E. by N. Here will be found from 2 to 3 fathoms at low-water, over sandy ground; but there is not space in the pool for more than half a

dozen vessels to lie afloat at low-water, and the tides are occasionally very strong. Vessels, however, may safely berth on the strand abreast Aberdovey.

The river is navigable towards Machynlleth by boats and small vessels for the period of tide towards high-water, but the channel is intricate and changeable and known only to local pilots.

**CAUTION.**—Considering the variable character of the bar, and the narrowness of the channel, together with the heavy swell that often rolls in from the westward, no prudent man would incur the responsibility of entering without the assistance of a pilot.

The harbour is on no account to be taken at night, and should the pilots not be able to get off on account of sea, they place their boat as low down towards the bar as practicable, and their signals are to be attended to.

If, from the loss of masts, or other circumstances, a vessel is unable to maintain an offing, the best place for beaching is abreast the farm of Moel Ynys, more than one mile to the southward of the bar, where, if the beach be taken towards high-water, vessels of small draft will receive but little injury.

**Life-Boat**—A life-boat is stationed at Aberdovey.

The railway station is upon the opposite side of the estuary, near Ynyslas, and from whence a line of rails is laid down to Cerig-y-Pentwyn for the convenience of shipping slates. A ferry also crosses the river at the same point.

Aberdovey is a creek of Aberystwith.

**TOWYN.**—At the north side of the entrance to the Dovey, the high land of Mynydd Bychan approaches to within one quarter of a mile of the sandhills forming the point, and Corlan Fraith,  $2\frac{1}{2}$  miles inland, is elevated 1,326 feet; farther north the highland recedes from the coast, which becomes low and marshy. At the foot of the hills  $2\frac{3}{4}$  miles from the entrance to the Dovey, and three-quarters of a mile from the coast, is the market town of Towyn, with a fine old church and steeple; but from standing low it is not conspicuous from the sea. Some large bathing houses upon the shore abreast, are very prominent.

**Dysynni River** is a small stream which runs into the sea 4 miles from Aberdovey, but it will not admit vessels of even the smallest class. The high land again approaches the coast on the north side of this river, terminating in the abrupt hill Pen Bwch, 635 feet in height, on the summit of which is a lozenge-shaped beacon supported by stays; near it, the farmhouse of Trevana, a solitary object upon a long ridge, is conspicuous from the southward. The Welsh coast railway crosses the mouth of the river, and continues along the shore to Barmouth.

**SARN-Y-BWCH.**—This dangerous shoal projects in a west direction from abreast Trevana farm for 2 miles into the sea, and is dry at low-water springs for more than one mile out. It is composed of large loose stones, and the ledge is narrow and so steep upon both sides that the lead falls suddenly from 4 feet into 4 fathoms, over sand. The outer end deepens gradually with depths of 2, 3, and 4 fathoms, over sand and stones intermixed, and 5 fathoms is found at  $2\frac{1}{2}$  miles from the shore. A depth of 2 fathoms upon the outer part of the shoal bears from Trevana farmhouse, West,  $2\frac{1}{6}$  miles; from Mynydd Buchan point, N.N.W.  $\frac{1}{2}$  W.,  $5\frac{1}{2}$  miles; from Aberystwith castle, N.  $\frac{1}{2}$  E.,  $11\frac{1}{2}$  miles; and from the end of Gynfelin outer patch, N.E.  $\frac{3}{4}$  N., 10 miles.

**Buoy.**—The outer end is marked by a can buoy, *striped horizontally black and white*, in 6 fathoms, with Aberystwith castle ruin, under the left shoulder of Pen-y-Dinas, bearing S.  $\frac{1}{4}$  W.; and Ffigle Fawr hill, near Barmouth, over Borthwen point, N.E. by E.  $\frac{1}{2}$  E. From it, the perch buoy of Sarn Badrig bears N.W. by N., distant 10 miles; Aberdovey entrance buoy, S.S.E.  $\frac{3}{4}$  E.,  $5\frac{1}{2}$  miles; and Barmouth fairway buoy about N.E.  $\frac{1}{2}$  E.,  $8\frac{2}{3}$  miles.

In the absence of the buoy, the Sarn-y-Bwch will be cleared half a mile to the north-westward by keeping the remarkable hill Ffigle Fawr, (upon the south side of Barmouth harbour,) just clear of the high bluff land about Borthwen point, bearing N.E. by E.  $\frac{1}{2}$  E. (View C., chart 1,411); and the rounded hill Foel Wyllt, standing by itself in the valley of the Dysynni, kept open to the southward of the low point of Pen Bwch, E.  $\frac{1}{4}$  S., will clear it to the southward in 3 fathoms at low-water.

**BORTHWEN POINT.**—From Trevana, the coast extends N.E.  $\frac{3}{4}$  N., and then N.E.  $\frac{1}{4}$  E., for 4 miles to Borthwen, where is a low shingle point with a small village. From thence trending E. by N.  $\frac{3}{4}$  N. for  $1\frac{1}{2}$  mile, it turns northward towards the entrance to Barmouth river, and in no part should be approached nearer than half a mile, as it is fringed by large stones. From the beach the land rises in a succession of steep and rocky hills, which form the group or base of Cader Idris.

**River Mawddach**, or Maw, the outlet of which forms the harbour of Barmouth, rises in the north-east in the parish of Llauuwchllyn, and is a mountain torrent for some miles, augmented by the Eden from the north and other minor streams, and having passed Dolgelly on the north side, it shortly after becomes a tidal and navigable river, expanding into an estuary of considerable width which terminates seaward at Barmouth.

**BARMOUTH HARBOUR**\* is but little inferior to that at Aberdovey, and if properly lighted would prove an asylum for small vessels

\* See Admiralty plan of Barmouth, No. 1487; scale,  $m=4\cdot0$  inches.

under many trying circumstances. It is not easily entered by a stranger, and as there are no lights of any description, entry into it at night is impracticable. The high-water entrance is not more than 230 yards wide between Penrhyn point and the small sandy islet Ynys-y-Brawd, lying about half-way across from Penrhyn point to the town of Barmouth, and at low-water the channel is reduced to half that width. From Penrhyn, or Ferry-house point, a sandbank extends seaward for three-quarters of a mile, which, turning to the northward, ends in a spit throwing the channel of the river considerably to the northward of its natural course.

**Ynys-y-Brawd** lies about S.E. by S. and N.W. by N., and though but a small islet is of great value to the port, as the two groynes projecting from its south-east and north-west ends materially assist in securing the channel and in covering in the harbour. A bank of stones, covered at high-water, extends one-third of a mile in a W.S.W. direction from Ynys-y-Brawd, and, as there is not more than 4 feet over it at high-water springs, a beacon has been placed upon its western point.

Between Ynys-y-Brawd and Barmouth, is a shallow swashway, running in a north-west direction nearly, but it is seldom used. A ferry plies between the town and Penrhyn point.

The Welsh coast railway crosses the estuary from Borten point, a little above the town, on a viaduct of wood piles, connecting with an embankment from the south side to the westward of Ffigle Fawr. The whole length is 2,487 feet, and over the channel of the river which has here a pool of about 30 feet, there is a drawbridge of 48 feet span to allow of the passage of vessels.

**Buoys.**—The banks at the entrance to Barmouth being liable to change, the positions of the buoys are altered accordingly, and will therefore be found in the deepest water, but probably not where marked upon the chart.

The fairway buoy is *black*, and lies in 18 feet at low-water springs, it will generally be picked up with Ffigle Fawr nearly in a line with the south face of Cader Idris; about three-quarters of a mile farther in is a *red* buoy lying just outside the spit which extends west from the beacon.

**TIDES.**—It is high-water, full and change, at Barmouth quay, at 7h. 41m.; springs rise 17 feet, neaps 13½ feet.

As in the case of most estuaries, the tide streams, particularly that of the ebb, have great strength and must be carefully attended to, as they cannot be stemmed in springs, except with a strong leading wind.

Outside the bar, at half a mile off shore, the flood sets N.E. by E., and the ebb about S.S.W., the rate of neither, at that distance, exceeding half a knot.

Vessels waiting tide may anchor anywhere outside the bar, the lead and the state of the tide being the best guides.

**Pilots.**—The pilots are hovellers, and their charge is by agreement.

**Directions.**—At low-water springs there is only half a foot upon Barmouth bar, and, as before observed, it is liable to change.

It is to be remembered that the sands are uncovered at low-water to the line between the *red* buoy and the outer end of the south-east groyne from Ynys-y-Brawd; and, from the same buoy, seaward, the low-water margin of the bank takes a northerly direction, bounding with the sand-bank upon the opposite, or Penrhyn side, the entrance channel to the harbour.

Vessels may identify the position of Barmouth from the sea, from its having the remarkable mountain Cader Idris to the south-eastward of it, and the no less conspicuous mountains Moelfre, Rhinog Fawr, and Craig Ddrwg, to the northward of it.

From the fairway buoy, steer for the spit buoy, or, in the event of its removal, with Ffigle Fawr in line with, or open to the southward of the beacon, and it will generally lead over the bar in the best water. Be careful in rounding the spit if the buoy does not watch, but if it does, pass close to the southward of it, and steer for the end of the south-eastern groyne, pass it within a sloop's length, and then act according to circumstances.

It would be useless to give directions for working into and out of this harbour, as local pilots ought to have charge of the vessel in such a case. Vessels running for the port in heavy weather will always find the pilot-boat lying at the spit buoy to direct them.

In extremity, beach at the entrance of the north-west swash as the best means for saving life.

**Barmouth** is of considerable size, numerous houses are dispersed either among the sand-hills which skirt the shore or are scattered over the face of the rocky height above the town. The trade has somewhat decreased of late years, and the town is now principally supported by visitors, with whom it is a favourite resort. There is a landing quay in front of the town, affording accommodation for about a dozen sloops, which lie upon the clean sand abreast out of the tide. There are also two holes in the channel where a couple of vessels drawing 8 feet may lie afloat at all times; the first, which is just outside the south-east groyne, with a bottom of clay, should not be used except in emergency, because it is in the track of vessels, and exposed to a strong tide as well as to a heavy sea at high-water; the other is close to the rocks, just above the drawbridge, but a vessel here would need to be well secured as the tides at springs are very rapid. The ground of the harbour generally is shifting sand over rock.

**Life-Boat.**—A life-boat is stationed at Barmouth.

Good water may be obtained from a small stream in Aberamfrach bay, one-third of a mile above Barmouth; and other supplies, including coal,



may be had in moderate quantities. Ship-building is carried on to some extent; the exports consist of tin, copper, and lead ore, timber, and dates; and the imports, of coal, iron, limestone, and general supplies.

Barmouth is a creek of Aberystwyth.

**COAST.**—The coast runs N. by W. for 7 miles from Barmouth to the low outer point of Mochras island, and consists of low sand-hills skirting a swamp or marsh of varying width. At the little church of Llanaber,  $1\frac{1}{2}$  mile from Barmouth, the high land retires from the coast and continues in a nearly straight direction from Harlech, with several populous villages at the foot of it. The shore, a sandy strand, is free from all obstructions to within  $2\frac{1}{2}$  miles of Mochras island, when the coast is rendered dangerous by Bemar bank, the Sarn Badrig, and Mochras spit.

**BEMAR BANK**, a small patch of large stones rather less than three-quarters of a mile outside high-water mark, with not more than 5 feet over it at low-water springs, has a safe channel within it. Between it and the shore the depth is 2 or 3 fathoms, and between the bank and the Sarn Badrig  $2\frac{1}{2}$  fathoms.

**MOCHRAS SPIT** is a dangerous projection of stony ground, extending out nearly 2 miles S.W. by W.  $\frac{1}{2}$  W. from the point of Mochras, and nearly parallel with the Sarn Badrig, rendering it necessary for vessels to be careful in hauling out sufficiently after having cleared the inner end of the Sarn. The spit is composed of loose stones, and the depth upon it is only 5 feet at one mile off-shore, and 9 feet at its outer end.

**BADRIG EAST PASS.**—The extensive and dangerous shoal, the Sarn Badrig, to be presently described, has its inner end within three-quarters of a mile of the shore, between Bemar bank and Mochras spit. Upon it there is 4 feet at low-water, but the channel within it, the East Badrig pass, has a depth of 4 fathoms.

For this channel, which can only be safely navigated during day-light, the following marks are to be used. To pass between Bemar bank and the Sarn Badrig, bring the low outer point of Mochras island nearly in line with the highest part of Moelfre Guest, bearing about N. by E.  $\frac{1}{2}$  E.; continue upon this line until Moelfre mountain has been brought to bear E. by S., and then run upon the opposite course W. by N., until Moel Guest bears N.N.E.  $\frac{1}{2}$  E., when it will be in line with the high and distant mountain, Moel Hebog.

All dangers on the north side of the Sarn Badrig, except two small patches to be hereafter described, will now have been cleared, and a course may be shaped accordingly. Moelfre is a large round-topped mountain, and the nearest to the coast, rising above the village of Llanddwy to the height of 1,050 feet.

**SARN BADRIG, or CAUSEWAY.**—This remarkable reef projects W. by S.  $\frac{1}{4}$  S. upwards of 10 miles from the Merioneth shore, obstructing the navigation of that part of Cardigan bay, and to any vessel embayed between it and the Sarn Gynfelin in a westerly gale, escape seaward would be hopeless. During fine weather the edge of the shoal shows itself by the ripple or overfall of the tide, which runs across it with considerable velocity, and in blowing weather a heavy sea breaks upon it. The Sarn Badrig appears to be generally composed of large loose stones, and, though the ridge is narrow, its outer end is an extensive patch of rocks and stones, as if it had been doubled back by the violence of the sea. Many of the stones, which dry one foot and a half at low-water springs, measure three yards across. Two prongs, one mile, and one mile and a quarter in length, project W.  $\frac{1}{4}$  N. and S.S.E. from the dry rocks; they have from 6 to 9 feet upon them, and both deepen suddenly to 3, 4, and 6 fathoms. For upwards of three miles within the western or outer end of the ridge, many spots upon it dry occasionally at low-water springs; then occurs an interval of one mile and a half, having a depth of 3 to 9 feet; and for the remaining 5 miles to its eastern end, it dries in spots and patches. This inner extremity, as before stated, is separated from the shore by a channel three-quarters of a mile wide, with 4 fathoms in it.\*

The bearings and distances to the outer extremity or west prong of Sarn Badrig, in 2 fathoms, are as follows, viz.: from Gynfelin patch buoy, N.  $\frac{1}{2}$  E., 16 miles; from St. Tudwall east island, S.  $\frac{1}{4}$  E.,  $7\frac{1}{4}$  miles; from Penkilan head, S.S.E.  $\frac{1}{2}$  E.,  $7\frac{1}{4}$  miles; and from Bardsey lighthouse, S.E. by E., 16 miles.

**Buoy.**—A conical buoy, *striped horizontally black and white*, with staff and diamond, and marked "Causeway," lies near the west end of the Sarn Badrig in 5 fathoms at low-water springs; with Snowdon, directly over a sharp-topped mountain, bearing N.E.  $\frac{1}{4}$  E.; the summit of Rhiw mountain, open west of Penkilan head, N. by W.  $\frac{1}{4}$  W.; Bardsey lighthouse, N.W.  $\frac{1}{4}$  W., distant  $14\frac{1}{2}$  miles; Llanbedrog mill, appearing in a score, and over St. Tudwall west island, N.  $\frac{1}{4}$  E., the latter 7 miles; Sarn-y-Bwch buoy, S.E. by S., 10 miles; and Cardigan bay light-vessel, W. by S.  $\frac{1}{2}$  S.,  $27\frac{1}{2}$  miles.

The *occulting* light at St. Tudwall west island changing from *white to red* on a N. by E. bearing leads over the position of Sarn Badrig buoy.

**Patches.**—The depths upon both sides of the Sarn Badrig are irregular, and the mariner should be cautious of several detached shoals upon its northern side. One is three-quarters of a mile from the ridge, and

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\* See Admiralty chart of Sarn Badrig, Sarn-y-Bwch, and Port Madoc, No. 1,484 scale, m = 2.0 inches.

2½ miles from the shore, with from 7 to 10 feet of water over it; another is 1½ mile from the ridge, and 4¾ miles from the shore, with 12 feet over it; and a third is 2 miles north of the middle of the Sarn, 5½ miles off shore, and with 15 feet over it. W. ¾ N. 2¼ miles, and W. ½ S. 3¼ miles, from the south-west point of Mochras island are two smaller patches of 3 and 2¼ fathoms.

**Directions.**—In the absence of the buoy, to pass outside the western prong in 4½ or 5 fathoms, open the whole of Rhiw mountain to the westward of Penkilan head, bearing N.N.W. (View B, chart 1,411), and it will clear a depth of 12 feet, by three-quarters of a mile; for the same purpose Carn Madryn must not be brought to the westward of North, nor the Rivel mountains to the northward of N.N.E.

Harlech castle, in line with a sudden fall upon the south side of a mountain with a remarkable score in its centre, clears the western prong to the northward; and for the same purpose, Harlech castle should not be brought to the northward of E. by N. ¾ N. The above-mentioned mountain is between Moelwyn and Craig Ddrwg, and when the mark is in line, the fall alluded to will be found to touch the descending slope in connection with Craig Ddrwg. A better mark, perhaps, is to bring the table-topped mountain Rhinog Fach (which is the next one to the southward of the remarkable sharp-pointed mountain Rhinog Fawr), clear to the northward of Moelfre mountain, bearing E. ¼ N. Either of the foregoing marks will lead half a mile to the northward of the western prong.

To lead to the southward of the south prong, keep Rhinog Fach opened half-way out to the southward of Moelfre, bearing about E. by N. ½ N. This leads more than one mile to the southward of the main ridge of Sarn Badrig, but only just clear of the southern prong, and it is therefore advisable to open Rhinog Fach more when in the vicinity of this spur. Moelfre should never be brought to the eastward of E. by N. ½ N., and it is necessary to caution the mariner that the latter mountain is indistinct in certain lights, and that the back land is often capped by clouds.

No satisfactory night mark can be given, but it may be of service to state that, if Bardsey light be visible, it must not be brought to the westward of N.W. ¼ W., so as to give the outer end of the Sarn a berth of about 2½ miles.

**Depths towards Penkilan Head.**—In rounding Bardsey island, and proceeding to the eastward between the Sarn Badrig and Penkilan head, the changes in the bottom are well marked, and of great service in determining a ship's position. Half-way between the western end of the Sarn and the head, the depths increase to 14 fathoms, and even to 23 fathoms, mostly over mud, and this hollow, about 2 miles wide, extends eastward to abreast St. Tudwall islands, where there are from 9 to

10 fathoms, and these latter depths may be carried well into Tremadoc bay. To the eastward from abreast Gimlet rock, the bottom changes from stones to mud, and this latter character is maintained to within one mile of port Madoc fairway buoy. This muddy hollow generally conforms in direction with the coast of Carnarvonshire, its inner edge being about  $1\frac{1}{2}$  mile from the shore; the opposite side is nearly parallel to the Sarn, but does not approach it nearer than 4 miles.

**Depths to the Northward.**—If a ship be somewhere off Penkylan head, standing to the southward, she must, if she be to the westward of St. Tudwall islands, cross the muddy hollow just mentioned, and in approaching the Sarn she may possibly shoal the water in a couple of casts from 17 or 16 fathoms to 8, 6, or 5 fathoms, in which latter depth she will be about 3 miles from the Sarn end. By attending to the lead, therefore, and by other precautions which the chart will suggest, a vessel may always be warned of her approach to the Sarn Badrig. It may be generally observed that, so long as a vessel does not approach the north side of the shoal into a less depth than 7 fathoms, low-water springs, she will be at least 2 or 3 miles from every part of it, with the exception of the western prong.

**Depths to the Southward.**—It is difficult to give any directions for avoiding the south side of the Sarn Badrig at night or in thick weather. A stranger bound to Barmouth is recommended not to pass within the outer end of the Sarn after dusk, as the depths are everywhere too uniform to be useful as a guide, and also that, should the wind ply to the westward, it would be both difficult and dangerous to work out again. To insure a sufficient offing at night, therefore, maintain a depth of 10 fathoms low-water springs, at the least, as 7 fathoms reduced to the same level will be found within half a mile of the southern prong, and within three-quarters of a mile of the extremity of the western prong. The same depth will be found three-quarters of a mile outside Sarn-y-Bwch, and, consequently, if less than 7 fathoms be found, the vessel will probably be within the line of the ends of Sarn-y-Bwch and the Sarn Badrig.

**Sarn Badrig, Tidal Streams.**—At the outer end of Sarn Badrig the flood stream sets about E.N.E. into Tremadoc bay at the rate of about one knot at springs. The ebb running S.S.W. at the same rate, was found to begin 4 hours after high-water by the shore.

The stream of flood sets very differently upon the opposite sides of the Badrig, half-way in upon the south side, for instance, its direction is about N.  $\frac{1}{2}$  E., which is its general set over nearly the whole of Barmouth bay; but on the north side of the reef it draws towards Tremadoc bay in about a N.E. by E. direction. The ebb stream sets S.S.W. as upon the north side.

Upon the north side of Sarn Badrig, at 6 or 7 miles from the land, the flood stream makes an hour and a quarter after low-water by the shore, and the ebb stream about  $2\frac{3}{4}$  hours after high-water.

**MOCHRAS ISLAND**, low and narrow, is separated from the swampy morfa, or moor of Diffryn, by Mochras creek, a broad inlet the sandy bottom of which is uncovered at low-water. The small stream of Afon Artro, which flows through the inlet, formerly issued at the west end of the island, but its waters have been diverted through a cut made between the east end of Mochras and the low rocky point upon the Harlech side, and this cut is used by the few small sloops which frequent the place. Mochras is only available for small vessels, and, sometimes, even boats find it difficult to enter.

**Harlech Castle.**—The low swampy coast changes to cliff one mile to the north-eastward of the cut, and, with a height of about 100 feet, continues to a little beyond Harlech castle, which, standing upon its brink north-east  $2\frac{1}{2}$  miles from Mochras, is a conspicuous object from the offing, and useful as a sea-mark. This ruined, but once important fortress, owed its erection like many others in the principality, to the policy and enterprize of Edward I. It appears to have been quadrangular, with round towers at the angles, and at the sides of the principal entrance.

The shore from Mochras island towards the castle is skirted by large stones, dry at low-water, and should not be approached nearer than a third of a mile, but one mile to the south-westward of the castle, a broad sandy strand turns off from the cliff in a northerly direction and fronting the morfa of Harlech for  $2\frac{1}{2}$  miles, it then becomes merged in the extensive sands Traeth Bach and Traeth Mawr.

**PORT MADOC.**—The entrance to the wide estuary, within which is situated the modern harbour of port Madoc, may be said to be between Harlech point and the small and nearly insulated hill Ynys Gyngar,  $1\frac{1}{4}$  mile to the northward of it, which breadth the estuary maintains for about one mile and a half to the eastward, where the tongue of high land, Penrhyn point, divides it into two sandy inlets, Traeth Bach, or the small sands, and Traeth Mawr, or the great sands, both of which are overflowed at high-water. Traeth Bach is only frequented by the boats conveying slates from Tan-y-Bwlch quarries to port Madoc.

From Ynys Gyngar to port Madoc, the river winds round the indented and rocky shore forming the foot of Moel Guest, which, being 915 feet high, and standing well apart, is an excellent mark for this portion of the coast.

**Sands and Buoyage.**—The sands dry out at low-water from Ynys Gyngar for more than half a mile, and their extremity, which forms the

north side of the entrance channel towards port Madoc, is about one mile to the westward of the hill. Harlech spit, the north-west extremity of the sands which stretch out continuously from Harlech point, overlaps the sand edges from Ynys Gyngar, throwing the channel to the northward of its natural course, and rendering it intricate and dangerous to a stranger. More than the foregoing general description is needless, as the sands forming the entrance, together with the outer portion of the channel, are constantly changing, and the positions of the buoys are altered accordingly.

A *black* nun fairway buoy lies in 14 or 15 feet at low-water springs, W. by S.,  $1\frac{1}{4}$  mile from Ynys Gyngar; a *red* can buoy marks Harlech spit; within is a *chequered* buoy; and, afterwards, another *black* buoy upon an elbow of the northern sands.

**The Bar**, rather nearer to the fairway buoy than to the *red* buoy, is of coarse sand with 3 to 4 feet over it, on the average, at low-water springs, but it is alternately deeper or shallower, after the occurrence of freshes, or of a continuance of on-shore winds.

**TIDES.**—It is high-water, full and change, at port Madoc, at 7h. 30m.; springs rise 17 feet at the bar, and from two to three feet less at port Madoc. Outside the bar, the rate of the stream is seldom more than three-quarters of a knot, but as the flood sets straight upon the shore, it must be carefully guarded against.

Port Madoc is of modern creation, and is due to the enterprize of the late Mr. Madocks, who enclosed a vast extent of the Traeth Mawr by an embankment, and converted a sandy waste into cultivated land; the embankment being nearly a mile long, and the land gained about 1,000 acres. Port Madoc, in close vicinity to the sluices at the north-west end of the embankment, has become a harbour of considerable importance; it has several quays, from whence great quantities of slate from the Festiniog and other quarries are shipped, a tramway from the former passing over the embankment. In the channel a short distance below the quays, there is a depth of 5 or 6 feet at low-water, so that a few vessels may always be water-borne.

The Cambrian railway winds round the head of Traeth Bach, and crosses Traeth Mawr on a pile viaduct and embankment between Tremadoc and the port.

**Pilots.**—There are seven licensed pilots for port Madoc, but as they only use open boats, they are often unable to cross the bar; at such times they station themselves upon the sand-hills over Fechan point to direct by signals, and afterwards to board. Their charge in and out varies from 4*d.* to 2*d.* per ton register, according as the vessel is loaded or light.

**Life-Boat.**—A life-boat is stationed at port Madoc.

**Directions.**—Port Madoc may be entered on springs by vessels drawing 16 feet, and at neaps by those of 10 feet. In westerly winds vessels bound to the port generally anchor in St. Tudwall road, quitting it in time to save tide in.

Harlech castle and Moel Guest sufficiently point out the position of the entrance channel to port Madoc. In closing from seaward, bring the saddle upon the southern side of Moelwyn mountain to bear E. by N.  $\frac{1}{2}$  N., and in keeping this course and nearing the land, Garth hill and the low rocky north shore within Ynys Gyngar, will appear nearly under the saddle above mentioned, and which is the general mark for leading up to the fairway buoy. The buoy may be passed on either side according to the direction of the wind, thus, if the wind be westerly, leave the buoy to the eastward, as the flood stream sets over Harlech spit; but if the wind be easterly, it is prudent to pass to windward of it to obtain more water, and to be able to haul close round to the northward of the red buoy.

Should the fairway buoy be gone, keep the leading mark just in line until the spit red buoy bears N.E.  $\frac{1}{2}$  E., which will also be the bearing of the east part of the summit of Moel Guest; after rounding the red buoy closely, pass the mid-channel *chequered* buoy on either side, and a short berth to the southward of the black buoy, and then steer for Fechan point, where a pilot will board. E. by N.  $\frac{1}{2}$  N.,  $1\frac{1}{2}$  cables within Fechan point is a small and dangerous rock called the Gomer, at times dry at low-water springs; it may be passed on either side, but the channel is not more than 100 yards wide altogether, and it continues equally narrow for the remainder of the way up to port Madoc. There are no established lights, but the pilots sometimes place one on the red buoy for their own use.

The foregoing are the best directions which can be given for port Madoc. A leading wind is necessary to enable a stranger to pass through the several reaches safely, but, owing to the shifting character of the entrance between wide-spread sands, due to the heavy on-shore sea, and to the freshes, which are very heavy in winter, it will generally be the more prudent course to take a pilot.

In case of extremity, endeavour to beach the vessel midway between Harlech castle and Harlech point, for the shore consists of sand over clay, and life is safe so long as the crew stick by the vessel.

**Trade.**—The exports consist principally of slates, and copper and lead ores; and the imports of coal, limestone, American timber, and general supplies.

Ship-building is carried on to a considerable extent, the vessels built averaging from 150 to 200 tons. Supplies of all kinds are plentiful, and spring water may be obtained from a pipe at the quay side. A fortnightly

communication with Liverpool is kept up by steamer. Port Madoc is a creek of Carnarvon.

**CRICKIETH Castle.**—From Ynys Gyngar it is N.W. by W.  $\frac{1}{4}$  W. 3 miles to Crickieth, or Criccieth castle, and the intervening low and swampy coast is interrupted by three headlands, the middle and largest of which, Craigdhu, is bold and upwards of 150 feet in height; the coast to the north-westward of the craig is skirted by stones and gravel. Crickieth castle stands upon a bold promontory washed by the sea, and was originally a stronghold of Edward I.; the ruins now embrace portions of three towers, two of them being upon the verge of the rock.

**Life-Boat.**—A life-boat at Crickieth is kept in constant readiness; a crew being easily obtained from among the numerous fishermen of the village.

**PEN-Y-CHAIN POINT.\***—From Crickieth castle the coast extends W. by N.  $\frac{1}{4}$  N. for 3 miles, and then turns abruptly south-westerly to the low but bluff point, Pen-y-Chain (pronounced Pen-ukan). The height of the point is 60 feet only, but, from its being backed by low ground, it is conspicuous from both sides, and is the only point between Crickieth castle and Gimlet rock. The entire coast is low, and fronted at low-water by large stones, particularly about mid-way between the castle and the point, while the bay immediately to the eastward of the latter is so encumbered by stones that no vessel should attempt to stand into it. Gimlet rock kept open of Pen-y-Chain point, will clear all dangers to the eastward of the latter, with the exception of a sunken rock lying one cable S. by E.  $\frac{1}{4}$  E. from the pitch of the point, and which, near low-water time, is a dangerous obstruction to small vessels working along shore.

**GIMLET ROCK.**—From Pen-y-Chain point, the coast, composed of shingle backed by small sand-hills, extends N.W. by W.  $\frac{1}{4}$  W. for  $2\frac{1}{4}$  miles; when, sweeping out to the southward, it forms a small bay, terminated westerly by Gimlet rock. This rock, which is upon the south side of the entrance to the small dry harbour of Pwllheli, is one of the most remarkable objects upon the coast; it is a huge mass of granite, with its summit about 140 feet above the level of the sea, and from being at the extremity of a low sandy spit, it appears like an island.

Between Pen-y-Chain point and Gimlet rock nothing shows near the surface, but the frontage abounds with shallow patches, many of them with 9 feet over them at low-water, and one, a mile to the southward of the Gimlet, has only 6 feet upon it. Unless bound to Pwllheli, therefore, no vessel should entangle herself among them, but with Moelwyn and

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\* See Admiralty chart of Pwllheli road, No. 1505; scale, m. = 4.0 inches.



Moel Guest in line, she should keep in a depth of 5 or 6 fathoms; or, as another clearing mark, she should not bring the hill Mynydd Cwmwd to the westward of W. by N.  $\frac{3}{4}$  N.

Two sharp-pointed hills upon the adjacent high ground at the back of Pwllheli, Clogwyn Mawr, one mile to the north-eastward of the town, and Garn rock, a quarter of a mile to the north-westward, are both remarkable objects, and useful as sea-marks for the shoals above mentioned.

**Pen-y-Chain Shoal.**—The first of them is Pen-y-Chain shoal, W. by S., three-quarters of a mile from the point, with 9 feet over it at low-water, and upwards of 3 fathoms within it. The summit of Carn Madryn in line with the eastern part of the Gimlet, leads over it; to clear it to the southward, open the Carn to the south-westward of the rock bearing about N.W. by W.  $\frac{3}{4}$  W.; and to clear it to the northward, bring Glan-y-don, a single house upon the shingle point north of the Gimlet, in line under the summit of Carn Madryn, about W.N.W.

**Outer Pen-y-Chain Shoal**, also with 9 feet over it, bears S.W. by W.  $\frac{2}{3}$  W.  $1\frac{1}{2}$  mile from Pen-y-Chain point, and S.E.  $\frac{1}{4}$  S., the same distance from the Gimlet. Garn rock over the highest part of the Gimlet leads across its centre, but it is so small as to be cleared with the Garn on either side of the Gimlet, and the eastern of these clearing marks will lead a vessel directly towards the entrance to Pwllheli harbour.

**GIMLET SHOALS** are more extensive than the other banks, and must be carefully avoided, for there is only a depth of 6 feet over them, and they occasion a heavy breaking sea in bad weather. They are at the distances of two-thirds of a mile, to one mile and a quarter from the Gimlet, and are contained between the directions S. by E.  $\frac{1}{2}$  E. and S. by W.  $\frac{1}{2}$  W. from that rock. The shoalest patch is W. by S.  $2\frac{9}{10}$  miles from Pen-y-Chain point, and South one mile from the Gimlet; and Fridd farm, a conspicuous white house at the back of Pwllheli, and to the right of Garn rock, in line over the west and lowest part of Gimlet rock, will lead right over it.

Clogwyn Mawr, well open of the west end of the Gimlet, bearing N. by E.  $\frac{3}{4}$  E., clears all these shoals to the westward; Fridd farmhouse, over the east end of the Gimlet, N. by W.  $\frac{2}{3}$  W., clears them to the eastward; but for clearing them to the southward there is no nearer mark than Moelwyn over Moel Guest, or to keep the latter to the northward of E.  $\frac{3}{4}$  N.

**TIDES.**—It is high-water, full and change, at Pwllheli bar, at 7h. 46m.; springs rise  $13\frac{1}{2}$  feet, neaps  $9\frac{1}{2}$  feet.

At one mile outside the Gimlet the flood sets East, and the ebb about W. by S., the rate at springs being about one knot. The ebb-stream makes there an hour before high-water by the shore, but close to the Gimlet

it turns nearly two hours before high-water, and sets strongly across the mouth of the harbour and round that rock.

**PWLLHELI**, or the salt-water pit, as the name implies, is pleasantly situated, and the surrounding scenery is beautiful and varied. The harbour dries, and is only suited to vessels of small burden, those of 12 or 13 feet draft may find entrance into it on springs, and those of 8 feet on neaps. Many hundreds of acres of land, formerly under water, are now secured from the sea by embankments, and are under cultivation, but this enclosure, by reducing the back-water, has had the ill-effect of causing the deep water formerly found alongside the Gimlet to give place to an accumulation of sand, whereby the entrance is nearly choked up. The harbour should never be attempted without a pilot, for the mouth is very narrow, and the bar and channel frequently shift.

The mark for anchoring while waiting tide is, Rivel mountain in line with Clogwyn Mawr, bearing N.  $\frac{1}{4}$  E.; and the ruin of an old mill upon a range of high land at the back of Mynydd Cwmmwd, just open outside Gimlet rock, W.  $\frac{1}{4}$  N.

**Trade.**—Ship-building is carried on at Pwllheli to a considerable extent, and it has a fair amount of coasting trade. Lobsters, oysters, and other shell fish, are abundant. Agricultural produce is exported, and coal and general goods imported. Pwllheli is a creek of Carnarvon.

The population in 1881 was 3,239.

The railway from Tremadoc passes near the shore to Pwllheli, and there at present terminates.

From the Gimlet it is about W. by S.  $\frac{1}{4}$  S.,  $3\frac{1}{4}$  miles to the foot of Mynydd Cwmmwd, or Llanbedrog point, the coast consisting generally of low sand-hills, but, one mile to the eastward of the hill above named, a small rocky promontory, Carreg Dyffed, or Sheep rock, rises to 60 feet above the bank.

**OYSTER BANK.**—The first part of the low-water shore between the Gimlet and Mynydd Cwmmwd is sand, but the remainder is interspersed with large stones; near Sheep rock they dry to nearly half a mile below the high-water margin, and from this elbow an oyster bank, with very little water over it, projects to the southward. At the distance of three-quarters of a mile out from Sheep rock, there is a depth of 4 feet only at low-water springs, and 10 feet at one mile and a half, from whence the edge of the bank turns north-easterly towards Gimlet rock. As it does not extend beyond abreast Sheep rock, it leaves the approach to Llanbedrog point partly unobstructed. The Gimlet should not be brought to the eastward of N.E.  $\frac{1}{4}$  E. to clear the Oyster bank to the south-eastward.

Mynydd Cwmmwd, a well-marked hill for the north part of Cardigan bay, rises rapidly from the low ground on the land side to the height of 440

feet, while its foot is washed by the sea. The small church of Llanbedrog and a few houses stand near its base on the north-east side, and Llanbedrog mill, a useful mark for St. Tudwall road, is about half a mile to the northward.

**ABERSOCH BAY.**—Between Mynydd Cwmwd and the promontory of Penrhyn-du, is the sandy bay of Abersoch, the low point and village of that name being about  $1\frac{3}{4}$  mile from Llanbedrog point. A small stream which discharges itself near the point, and from which the name is derived, is resorted to by a few sloops with coal and limestone. The mill of Llanengan, upon elevated ground to the westward of the village, is a useful mark for St. Tudwall roads.

**A Life-Boat** is stationed at Abersoch.

**PENRHYN-DU Promontory.**—The high bold promontory Penrhyn-du has its eastern termination in the low point, Porth-bach, where is a lead mine in full operation; and its south-eastern boundary in Wylfa head, which has a steep rocky face and is 400 feet high, while its principal projection, Penkilan head,  $1\frac{3}{8}$  mile farther to the westward, projects boldly out to the southward, and is usually considered as the northern limit of Cardigan bay.

**ST. TUDWALL ISLANDS and SOUND.**—Abreast the eastern face of the promontory between the two first-mentioned points, are St. Tudwall islands; West island being about 4 cables from the nearest part of the shore. The intervening passage, St. Tudwall sound, is a safe channel for vessels entering or quitting St. Tudwall roads, it being clear on both sides, with a depth of 6 to 8 fathoms in it. The tides, however, are strong, and when opposed by the wind, cause a short cross sea; but, if blowing hard from the northward or westward, it is always advisable to pass through the sound to St. Tudwall roads.

East island is about one-quarter of a mile north-eastward of West island; they are from 120 to 130 feet high. The 4-fathoms passage between them is seldom used, but it affords a safe track in mid-channel, or rather nearer to East island. A rocky ledge projects  $1\frac{1}{4}$  cable from the north end of West island, and a patch of  $2\frac{3}{4}$  fathoms lies N.N.E.  $\frac{1}{2}$  E. 3 cables; the north side of East island is also foul for one cable.

**LIGHTS.**—From a circular white tower on West island is exhibited, at 151 feet above high-water, an *occulting* light which shows bright for *eight seconds*, followed by an eclipse of *two seconds*. The light is *white* between the bearings S. by W., through south and east, and N. by E.; *red* from N. by E. (on this bearing it leads over the position of Sarn Badrig buoy) to N.W.; *white* from N.W. to S.W. by W.  $\frac{1}{2}$  W.; and *red* from S.W. by W.  $\frac{1}{2}$  W. to S. by W.; it is, however, obscured by East island

between the bearings S.W.  $\frac{1}{2}$  W. and W. by S.  $\frac{1}{2}$  S. In clear weather, the light should be visible from a distance of 19 miles.

A *fixed red* light is also exhibited from a window in the same tower, 16 feet below the occulting light, in the direction of Carreg-y-trai, or between the bearings W. by N. and W.  $\frac{1}{2}$  S.

**CARREG-Y-TRAI**, a large rock uncovering at half-ebb, is about 3 cables to the south-eastward of East island; it is steep all round except at its north-east end from whence a reef extends out for 100 yards. The good channel between it and the island should only be used when the rock is seen.

A *fixed red* light shown from a window in the lighthouse on West island, 16 feet below the occulting light, between the bearings W. by N. and W.  $\frac{1}{2}$  S., covers Carreg-y-trai; and its position is indicated by day by a white patch on the cliff of West island in line with the lighthouse.

**Buoy.**—A bell buoy, *striped vertically black and white*, lies in 8 fathoms, 2 cables E.S.E. from Carreg-y-trai.

Llanengan mill, the summit of East island, and Carreg-y-trai, being all in line, ships should not haul up for St. Tudwall roads till the mill opens out to the northward of the island; Wylfa head open to the southward of West island will clear the rock to the southward; and the summit of Carn Madryn just open to the westward of an old fanless mill upon high ground at the back of Llanbedrog, an object not easily mistaken, will clear it to the eastward. It will also be cleared to the eastward so long as Gimlet rock is not brought to the eastward of N.E.  $\frac{1}{2}$  N.

**St. TUDWALL ROADS.**\*—St. Tudwall roads, contained between Llanbedrog point and East and West islands, are well protected in winds from south-west, through north, to E.N.E., but with strong winds from south-west, through south, to East they are exposed to a heavy sea, especially with southerly winds, when it would be difficult for a vessel to obtain an offing.

**St. Tudwall Shoal.**—Between Inner and Outer roads is a long and narrow sand-bank, stretching in a S.  $\frac{1}{2}$  W. direction from the inner part of Mynydd Cwmmwd to within three-quarters of a mile of East island, and of some foul ground forming the southern limit of the roads. This shoal must be avoided, even by small vessels, as there are 7 and 10 feet over it at low-water springs.

**Buoy.**—The southern spit of St. Tudwall shoal is marked by a *red* nun bay, which lies in  $2\frac{3}{4}$  fathoms at low-water of spring tides, with Porth Bach point bearing W. by S.  $\frac{1}{2}$  S., distant  $6\frac{1}{4}$  cables; Abersoch

\* See Admiralty chart of St. Tudwall roads, No. 1,505; scale,  $m = 4.0$  inches.

point, N.W.  $\frac{1}{2}$  N.,  $9\frac{1}{2}$  cables; and St. Tudwall lighthouse, S. by W.  $\frac{1}{2}$  W.,  $1\frac{1}{2}$  mile.

Llanbedrog mill, just shut in upon Mynydd Cwmmwd, bearing N.  $\frac{1}{4}$  E., is on the line of the centre ridge of the shoal.

**Outer Road.**—Ships should anchor in Outer road, or outside St. Tudwall shoal, with Rhiw Sugar-loaf, in line with Llanengan mill, bearing N.W. by W.  $\frac{3}{4}$  W., and the western point of East island, shutting in the south end of West island, bearing S.W.; here the depth will be 5 fathoms over sand.

**Inner Road.**—There is anchorage in Inner road in 7 fathoms, with Porth Bach point bearing W.  $\frac{1}{4}$  N.; and the western point of East island, S.S.E. Small vessels may anchor farther northward, in 4 fathoms, with Llanbedrog mill, open clear of the west part of Mynydd Cwmmwd, bearing N. by E.; the mill in this position will be seen through a narrow ravine.

**CAUTIONS.**—Vessels running for St. Tudwall roads by night, are either closing Wylfa head or the islands, when Bardsey light shuts in behind Penkilan head.

Ships should not anchor too far out, for with northerly winds, which occasionally descend with considerable violence from the high land, vessels frequently drive down the bank, and it is difficult to regain the anchorage; and vessels so driving have afterwards been lost upon the opposite shore of Cardigan bay.

It is also necessary to be cautious with a wind veering southerly; should it draw to the eastward, it is better to weigh and proceed round Bardsey, but if it hangs to the westward of south, dependence must be placed upon riding it out. Small vessels may, of course, run for Pwllheli at tide-time.

A vessel bound to port Madoc from St. Tudwall roads, should, if the wind be blowing hard from the westward, obtain a pilot at Abersoch, instead of trusting to the chance of procuring one at the bottom of the bay, for that is not always practicable, and it is an extremely difficult operation to get to windward again.

**TIDES.**—It is high-water, full and change, at St. Tudwall road, at 7h. 45m.; springs rise 14 feet, neaps  $9\frac{1}{2}$  feet.

**COAST.**—From Penkilan head, the southern projection of the promontory of Penrhyn-du, to Pen-y-kil at the entrance of Bardsey sound, the course is W.N.W. northerly,  $7\frac{1}{2}$  miles; and the intervening coast is broken into bays and is free of off-lying dangers.

**PORTH NIGEL.**—Immediately to the north-westward of Penkilan head is the large bay, Porth Nigel, more commonly known as

Hell mouth; it has tolerable anchorage in 10 or 12 fathoms, but it should be used only when absolutely necessary, as it has a strong indrift, and is liable to be visited suddenly by a heavy sea, rendering it both difficult and dangerous to work out.

**YNYS GWYLAN.**—Porth Nigel is succeeded by the bight Porth Cadlan, off the western point of which, called the Trwyn (or Nose) and about 6 miles N.W. by W.  $\frac{2}{3}$  W. from Penkilan, are the two islets Ynys Gwylan (Gull islands); they are mere rocks, affording pasture to about a dozen sheep. The passage within them is deep and navigable, there being 7 fathoms in the middle of it, and 4 fathoms within half a cable of each side.

**ABERDARON BAY.**—Between the Trwyn and Pen-y-kil is Aberdaron bay, which falls in north-easterly, and may be considered one mile deep and wide; it is well sheltered with the wind from north-west through north, to east, and vessels may anchor in it for a tide in fine weather, but as the holding-ground is bad, and the bay is exposed to the heavy sea which on this coast frequently precedes a southerly wind, it cannot be recommended as a desirable stopping-place. The average depth of water is 6 fathoms, over gravel and sand, and the best berth for bringing up is about the middle of the bay.

From Pen-y-kil the coast trends N.W.  $\frac{1}{2}$  N. for  $1\frac{1}{2}$  mile, and turns north-eastward at Braich-y-Pwll head at the north-west entrance of Bardsey sound, the shore being clear, with the exception of a large high-water rock, Carreg Dhu (black rock), which lies W. by N.  $\frac{1}{2}$  N. one-third of a mile from Pen-y-kil. Within the rock is a good channel, which may at times be advantageously used, as will be hereafter explained.

## CHAPTER III.

## BARDSEY ISLAND TO THE SKERRIES.

VARIATION IN 1884.

Off Bardsey,  $21^{\circ} 0'$  West. Off the Skerries,  $21^{\circ} 5'$  West.

**BARDSEY ISLAND\*** is separated from the extreme point of Carnarvonshire by Bardsey sound. The length of the island from north-east to south-west is  $1\frac{1}{2}$  mile, and its greatest breadth, which is at the north-east end, is two-thirds of a mile. Pen Diban, its south-western extremity, is low and rocky. The island contains about 84 inhabitants; the greater portion of it is under cultivation, and its shores supply abundance of lobsters and fish. Mount Bardsey, on its eastern side, is a conspicuous object, rising steeply from the sea to 550 feet above high-water, and with a bold, rocky, and safe coast at its foot.

The best landing-place is on the south side of the island in a sort of chasm in the rocks which has been artificially improved; it may be known by a small white boat-house standing on the shingle beach a little above high-water mark at its inner end. With south-west winds, landing may also be effected at half-tide on a shingle beach in Porth Solach, on the northern side of the island, but at either place landing should be attempted only in fine weather, except by those well acquainted with the island.

Communication between Bardsey island and the main is by Porth Mewdwy, a convenient little boat cove, with a sandy beach, on the north-west side of Aberdaron bay, where good fresh water may be obtained, and where landing may be effected when it would be unsafe to approach any other part of this coast. The state of the tide should be carefully attended to if it be proposed to visit Bardsey, for there is a difference of nearly three hours between the tide on the shore of the bay, and the turn of the stream in the middle of the sound, and the latter, at its strength, when opposed by the wind, causes a heavy breaking sea, consequently, the main should be left soon after high or low water by the shore, so as to insure a slack stream

\* See Admiralty chart, England, west coast, New Quay to Holyhead, No. 1,411; scale,  $m = 0.5$  inch.

by the time the boat reaches the sound; this arrangement has also the advantage of affording sufficient time to return before the next tide has acquired strength. The passage across must be, however, always a matter of more or less anxiety to a stranger, but as they have the means at Aberdaron of making signals to the island, a boat with experienced pilots can always be procured from thence.

**LIGHT.**—Bardsey lighthouse, standing near the south-west end of the island, is a square stone tower, 99 feet high. The light, which is fixed and of the natural colour, is elevated 129 feet above high-water, and, in clear weather, is visible at the distance of 17 miles, in all directions, except where the high north-eastern part of the island intervenes. In Carnarvon bay also, by the interception of the land, the light is not seen upon any bearing westward of S.W., and, consequently, off Porth Dylleyn, it is lost sight of at the distance of  $3\frac{1}{2}$  miles from the shore, where a vessel will have 16 or 17 fathoms at low-water, over gravel and sand.

**Fog Signal.**—A siren is sounded in thick or foggy weather, giving three blasts in quick succession every five minutes, in the following manner: the first blast a high note, the second a low note, and the third a high note.

The following are the bearings and distances of Bardsey lighthouse from some important points:—The Smalls lighthouse, N.E.  $\frac{1}{4}$  E., 69 $\frac{1}{2}$  miles; New Quay head, N.  $\frac{1}{4}$  W., 36 miles; Causeway buoy, west end of Sarn Badrig, N.W.  $\frac{1}{4}$  W., 14 $\frac{1}{2}$  miles; Penkilan head, W. by N.  $\frac{1}{4}$  N., 10 miles; South Stack lighthouse, S.S.W.  $\frac{1}{4}$  W., 33 $\frac{1}{2}$  miles; Carnarvon bay light-vessel, S.S.W.  $\frac{1}{4}$  W., nearly 21 miles; and Cardigan bay light-vessel N.E.  $\frac{1}{4}$  N., 22 miles.

Bardsey island may be approached on all sides to within a half-mile. On the south side there is nothing but what shows at all times of tide, but to the north and west rocks lie off, as follows:—

**Maen Bugail**, or Stone of Bugail, lies within the sound rather more than one-quarter of a mile from the north end of the island, so as to afford a passage between them; it is very small, and is covered only at high-water spring tides.

**Maen Iau** is a half-tide rock on the north-west side, a quarter of a mile from the north point of the island, but not more than one cable from the shore, to which it is partly connected by a reef.

**Carreg Rona** is a large patch which is scarcely covered at high-water; it also lies on the north-west side of, and abreast the middle of, the island, and one-quarter of a mile off-shore, but, as there is another dry patch of rocks within it, no stranger should attempt the passage.



There is also a patch with 6 fathoms over it, at about half a mile off-shore near the south-west end, which had better be avoided, as it occasions an overfall, and in blowing weather a heavy broken sea.

As the ebb sets strongly upon these rocks, the north-west side of the island should not be approached too closely in light winds.

**DEVIL RIDGE.**—Five miles S.E. by E.  $\frac{3}{4}$  E. from Bardsey lighthouse, and the same distance from Penkilan head, is the shallowest part of an extensive sand-bank called Devil ridge; it is about  $1\frac{3}{4}$  mile long, and nearly one mile broad, with 14 fathoms around it; in blowing weather, the overfall causes a very heavy sea. The least water,  $5\frac{1}{2}$  fathoms, is at the south end, and bears from Penkilan head, W.  $\frac{1}{4}$  S., 5 miles; and from Pen-y-kil point, S.S.E.  $\frac{1}{2}$  E. (the direction of the bank),  $3\frac{2}{3}$  miles.

To pass to the southward of this shoal, Penkilan head should not be brought to the eastward of E. by N.; and to clear it to the northward, a vessel, by keeping Bardsey lighthouse bearing W.  $\frac{1}{4}$  N., will maintain a depth of 16 fathoms about mid-channel between the shoal and Ynys Gwylan.

It is worthy of remark that in the old chart of Mr. Lewis Morris, published in 1748, there is as little as 3 fathoms marked on one part of Devil ridge, and though he has given the bank a wrong direction, yet the position he has assigned it is nearly correct.

**BASTRAM.**—The Bastram is a still more dangerous shoal in the vicinity of Bardsey island, from which its centre bears South, distant 2 miles. The depths on it are very irregular, varying from 8 to  $3\frac{1}{2}$  fathoms, and many patches of 4 fathoms lie between its north and south ends, which are about  $2\frac{1}{2}$  miles apart; the breadth is rather more than half a mile. There is a good channel, 18 to 20 fathoms deep, between the shoal and the island.

The bearing and distance from the shoalest spot are, Carn Madryn, in line with Rhiw mountain, N.E. by E.  $\frac{1}{2}$  E.; from Bardsey lighthouse, S.  $\frac{1}{2}$  E., 2 miles; and from Penkilan head, W.  $\frac{1}{2}$  N.,  $9\frac{1}{2}$  miles.

As there is 20 fathoms around it within half a mile, this shoal causes a great overfall of the tide, and in blowing weather a heavy sea; it is of importance therefore to avoid it. To pass to the southward of the Bastram, Penkilan head should not be brought to the eastward of E. by N.  $\frac{1}{4}$  N., until the bearing of Bardsey lighthouse is eastward of N.  $\frac{3}{4}$  E.; and to pass between the shoal and the island, as is frequently desirable, to avoid the strength of the ebb stream, keep Carn Madryn just open to the south-eastward of Pen-y-kil bearing N.E. by E.  $\frac{1}{2}$  E.

**BARDSEY SOUND** is about  $1\frac{1}{2}$  mile wide from cliff to cliff, and the only obstructions in it are the Carreg Dhu, which is always above

water, on the eastern side; and Maen Bugail, which is covered at high-water only, as before described, on the island side.

**TIDES.**—It is high-water, full and change, at Bardsey island, at 7h. 40m., and the rise is 15 feet at spring tides. The tide streams between Penkilan and Bardsey are considerably affected by the shoals; both flood and ebb in certain states of the tide set into the bays of Porth Nigel and Aberdaron, and the flood especially has a tendency to sweep a ship too near Ynys Gwylan; care must, therefore, be observed to avoid becoming embayed in either of these bights, as with southerly winds it would be found difficult to get out of them and obtain an offing.

Immediately to the eastward of Devil ridge, across which the tide sets strongly, the ebb stream continues two hours after low-water by the shore, but away from the neighbourhood of the shoals its rate does not exceed 2 knots.

The flood stream, which arrives from the S.S.E., splits upon Bardsey island; one portion runs close to it, passing to the north-west, round Pen Diban, and outside Carreg Rona, while the other portion, also running close to the island, sets through the sound, but within Maen Bugail, and unites with the outer branch of the stream about  $1\frac{1}{2}$  mile from the island. Within these two lines of tide there is an eddy which sets directly on the north end of the island.

The part of the flood stream which sets through the middle of the sound, and to the northward of Maen Bugail, has a N.N.W. direction, and gradually draws round to the north-east with the trend of the land. In the middle of the sound the stream has a velocity of nearly 6 knots at springs, and turns about  $2\frac{1}{2}$  hours after the shore tide.

The flood sets also inside Gwylan islands, around Aberdaron bay, washes the rocky foot of Pen-y-kil, and bends along the Carnarvonshire coast within Carreg Dhu. It should be borne in mind that this portion of the flood stream turns nearly at the same time as the shore tide, and, consequently, two hours earlier than the stream in the middle of the sound, so that a vessel may take advantage of it when bound north-eastward through the sound.

The ebb stream, arriving from the north-eastward, strikes Bardsey island on the north side, and, dividing there, one branch passes along its north-western shore to Pen Diban, and from thence to the southward, where it meets the other branch going through the sound at a couple of miles S.S.E. of the island. Over the intermediate space an eddy sets in for the south side of the island. With the ebb also it may be observed that by keeping on the Carnarvonshire side a vessel will have the stream setting to the southward long before it takes that direction in the sound. With the sound open, 2 miles to the north-west from either Braich-y-Pwll or

Bardsey island, the ebb stream does not hold for it, but continues to the south-westward with a velocity of 2 or  $2\frac{1}{2}$  knots per hour.

To the above remarks for navigating in the neighbourhood of Bardsey island, it may be added that, on leaving Penkilan head, off which there is 12 or 14 fathoms, the depths will gradually increase to 28 or 30 fathoms at  $\frac{1}{2}$  miles S.W. by W. from Bardsey lighthouse, but, as a vessel proceeds from thence northward, the water will be found to deepen to upwards of 40 fathoms, even within  $1\frac{1}{2}$  mile of the island; this depth occurs at the above distance, with the lighthouse bearing E. by S.  $\frac{1}{4}$  S.

In working through Bardsey sound, keep on the eastern side, except with strong northerly winds and a flood tide, when it is advisable to keep nearer the island, as the strong race of the flood tide round Braich-y-Pwll head produces a heavy sea, and an overfall near Tripod bank. With the wind from the southward, however, or during the ebb, there is less difficulty, but the mariner is to be cautioned that no ship should attempt the passage of Bardsey sound with an adverse wind, except under very favourable circumstances.

**CARNARVON BAY** is formed by the north coast of Carnarvonshire and the west coast of Anglesea, which nearly unite in the bottom of the bay, at the western entrance to Menai strait. The horns of the bay, namely, Bardsey island and South Stack (Holyhead island), are marked by excellent lights, which bear from each other about N.N.E.  $\frac{1}{4}$  E. and S.S.W.  $\frac{1}{4}$  W.,  $33\frac{1}{2}$  miles; within that line the bay may be said to be 14 miles deep.

See additional remarks upon using this bay, page 82.

**LIGHT-VESSEL.**—To facilitate the navigation of St. George channel, and to indicate to vessels their position when they may be influenced by the indraught of Carnarvon bay, a light-vessel was moored in December, 1869, between the South Stack and Bardsey island; she lies in about 30 fathoms, distant  $12\frac{3}{4}$  miles S.S.W.  $\frac{3}{4}$  W. from South Stack lighthouse; her position will consequently be *about* lat.  $53^{\circ} 5' 40''$  N., long.  $4^{\circ} 44' 30''$  W. The light *revolves*, showing red and white faces at intervals of *twenty seconds*, in the order of two white and one red; and, being elevated 36 feet above the water, it may be seen at the distance of 10 miles in clear weather. The vessel carries a small ball above the usual globe at the mast-head.

**Fog Signal.**—A fog siren is sounded during thick or foggy weather, giving one blast *every two minutes*.\*

From the vessel, Llanddwyn island lighthouse bears E.  $\frac{1}{4}$  S., distant  $12\frac{1}{4}$  miles; Porth Dynlleyn, S. by E.  $\frac{1}{3}$  E., 11 miles; and Bardsey lighthouse, S.S.W.  $\frac{1}{4}$  W., nearly 21 miles.

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\* See regulations respecting light-vessels, and vessels for marking wrecks, at page 30.

**BRAICH-Y-PWLL HEAD**, at the entrance of Bardsey sound, is a bold rocky cape, steep to, and rising to about 300 feet above the sea-level. From thence the coast to Porth Dynlleyn has a N.E. and then an E.N.E. direction for 12 miles, and the character of the shore continues bold and rocky, having 10 fathoms within half a mile of it, with the following exceptions:—

The **TRIPOD** is a bank of sand and shells, N. by E., upwards of one mile from Braich-y-Pwll head; and lies nearly parallel with the coast abreast, or N.N.E.  $\frac{1}{4}$  E. Its length, from 10 fathoms on each end, is about one mile, it is a quarter of a mile broad, and the depth of water over it varies from 7 to  $5\frac{1}{2}$  fathoms. Between the bank and the shore there is 17 fathoms, at one-quarter of a mile outside of it there is 20 fathoms, and at half a mile 30 fathoms. At its north end the water deepens suddenly to 15 fathoms, and at its south end to 18 and 20 fathoms.

The tide at springs has a velocity over the Tripod of about 3 knots, the flood setting about N.E. by N., and the ebb S.W. by W.; they produce overfalls, and during the flood with a northerly wind there is a very heavy sea, which vessels will do well to avoid.

To pass outside the Tripod, keep Bardsey lighthouse to the southward of S.S.W.  $\frac{1}{4}$  W.; and to pass through the deep water channel within it, keep the highest part of Bardsey just open of the extremity of Braich-y-Pwll, about S.W.  $\frac{1}{4}$  S. The shoal will have been well passed in going southward when the sound is so far open that Carreg Dhu may be seen.

**CARREG ALLAN** is a patch of foul ground between 2 and 3 cables from the shore, rather more than 2 miles from Braich-y-Pwll, and nearly abreast two small islets or rocks, which are scarcely detached from the land. The northernmost of these islets in line with the western spur of the little hill of Carreg, which rises close to the shore, is a cross-mark; and the low neck of Bardsey island in line with Braich-y-Pwll point, bearing S.W., is a long mark for it. Bardsey lighthouse opening to the westward of Braich-y-Pwll will lead outside the rocks. As there is as little as 10 feet over the patch at low-water it must be avoided even by small vessels.

**MAEN MELLT** is a large detached rock 20 feet above high-water,  $3\frac{1}{4}$  miles from Braich-y-Pwll, and about one-eighth of a mile from the shore; the channel within it is frequently used by small vessels going into the little bay of Porth Oer, but as the tides run strongly through, strangers had better avoid the passage. Except at its south-west end, where foul ground projects a short distance, the rock may be safely approached on all sides, care being taken to keep without the eddy.

**PORTH IAGO.**—Abreast Maen Mellt, and less than one-quarter mile from it, is the little bay Porth Iago, with a short ledge on its south-west side. It is sometimes used by small coasters for a tide in southerly winds and fine weather. As north-west winds drive in a heavy sea the bay should be quitted in time, and Porth Dynlleyn, only 8 miles farther to the north-eastward, should always be preferred.

Between Maen Mellt and Porth Dynlleyn point the only dangers are two foul patches to the south-westward of the latter, but they are nearly out of the track. The following, however, are their positions.

**Carreg-y-Trai**, which is covered at half-tide, bears S.W. by W.  $\frac{5}{8}$  W., upwards of half a mile from Carreg-coch, the extremity of Porth Dynlleyn point, and is 2 cables from the adjacent shore.

**Carreg-y-Chad**, with 4 feet over it at low-water springs, lies 2 cables farther to the north-west; it bears from Carreg-coch W. by S.  $\frac{3}{8}$  S. two-thirds of a mile, and from the nearest shore it is distant more than one-quarter mile. To avoid these rocks, keep Rivel mountain head open to the northward of Carreg-coch, bearing about E.  $\frac{1}{3}$  S.

**Tidal streams.**—The flood stream between Braich-y-Pwll and Porth Dynlleyn sets about N.E. and the ebb about S.W. by W., at a rate not exceeding 2 knots even at spring tides. Half-way between the above points and 2 miles off shore the streams turn an hour and a half after high and low water by the shore.

**PORTH DYNLLEYN or DINLLEYN BAY\*** is formed by a rocky projection of the coast from 60 to 100 feet high, the northern extremity of which is in lat.  $52^{\circ} 56' 55''$  N., and long.  $4^{\circ} 33' 53''$  W., and bears from South Stack lighthouse S.  $\frac{3}{4}$  W., 22 miles. The bay is clear throughout, with the exception of the large rock, Carreg-y-Chwislen, which may be approached within 50 yards on all sides. The rock, which is marked by a cone, surmounted by a mast and globe, painted *red*, is uncovered at the last quarter ebb, and lies E.  $\frac{3}{8}$  N., 2 cables from the point above mentioned; there is a clear passage, with 3 to 5 fathoms between them, which, though very useful to those acquainted with it, should not be attempted by a stranger, as the tides are strong; at low-water, however, all dangers are exposed, and then mid-channel may be kept without difficulty.

As the foreshore of the bay is flat, the ebb leaves uncovered a broad margin of fine sand throughout the whole of the southern part of it; but there is a rocky ledge near the houses which small vessels must be careful of in beaching.

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\* See Admiralty chart of Porth Dynlleyn, No. 1,122; scale,  $m = 3.9$  inches.

**TIDES.**—It is high-water, full and change, at Porth Dynlleyn, at 8h. 30m., and the rise of ordinary springs is 16 feet. The general set of the tide in the bay is from the eastward, along shore and through the sound, for 9 out of 12 hours. In the bay the rate is moderate, even at springs, but in the sound it then runs 3 knots.

**Directions.**—In running for Porth Dynlleyn from the northward, Carn Madryn will be found an excellent mark, as it is the westernmost mountain of any importance on the Carnarvonshire coast, except the Rhiw, and is insulated by low land. Run for Carn Madryn, on a S.S.W. bearing, until the low coast line is distinctly made out, and, as the bay is approached, look along the high-water bank from the houses to the eastward for a road leading up the bank from the sands; this road, called Bwlch Bridyn, cannot be mistaken, as it is the only one thereabouts, and Carn Madryn, kept open south of the road, bearing S.S.W.  $\frac{1}{2}$  W., will lead into the bay clear of Chwislen rock. If approaching from the westward do not haul into the bay until the above mark is in line.

In working into the anchorage from the north-eastward, a guide for tacking out to vessels drawing 10 feet, is to keep the summit of Carn Madryn in sight above the bank top; the lead, however, with proper attention, will give sufficient warning.

**Anchorage.**—The best anchorage in Porth Dynlleyn bay is in  $3\frac{1}{2}$  fathoms, with Carn Madryn in line with, or a little open either way of, the Bridyn road, according to the vessel's draft. The bottom is sand over clay, and the depth decreases gradually towards the beach. The bay affords no shelter from W.N.W. to north, but with the wind from many other points of the compass it may be used as a convenient and safe anchorage. Small vessels that are disposed to beach should be aware that there is no pier to shelter them from north-west winds, for the heap of stones intended to answer that purpose is worse than useless.

**Life-Boat.**—Porth Dynlleyn is a life-boat and rocket station.

Porth Dynlleyn is a creek of Carnarvon.

**PORTH NEVIN.**—Immediately to the eastward of Porth Dynlleyn is the shallow bight Nevin bay, with a small pier near its western point, which is rocky and shoal. The pier is dry at low-water, but it serves to shelter the few sloops trading there, and is very useful to fishing boats. The bay and the beach skirting it are of clear sand.

**Rivel Mountain.**—The general direction of the coast from Porth Dynlleyn is E. by N.  $\frac{1}{2}$  N. for 10 miles to the river Llyfni, when it trends more to the northward. Its general character, to where it turns towards the bar of Carnarvon, is high land gradually sloping towards the sea; this portion of it being the foot of a lofty and steep range of mountains, the

most remarkable of which is the Rivel, or, as it is called by the Welsh, Yr-Elff, one of the best landmarks in Carnarvon and Cardigan bays. In rounding Holyhead it appears as three very sharp peaks, the middle and highest of which, 1880 feet above the sea, slopes rapidly down, and terminates in a noble and picturesque cliff—the whole forming so remarkable a feature that it is impossible to mistake it, and it therefore serves as an infallible mark for identifying the land, and determining a vessel's position, which is further assisted by the cliff of Carreg Llam, rising almost perpendicularly from the water to the height of 488 feet,  $1\frac{1}{4}$  mile south-west of Rivel head.

**COAST.**—To the eastward of Porth Dynlleyn and Nevin bays, the water does not ebb out to any distance, and the coast may be closely approached by the lead to as far as Rivel head, but from thence for 6 miles a low shingle beach is uncovered by the ebb, and has large stones scattered over it, some of which are nearly half a mile from high-water mark; it is, therefore, not prudent, when they are covered, to stand into less than 5 fathoms, or to shut Rivel head in behind the long cliffy point called Trwynytal, which lies about  $1\frac{1}{4}$  mile to the eastward of it. Outside of this mark there is a clean bottom of sand, or sand and gravel, with not less than 4 or  $4\frac{1}{2}$  fathoms.

At the river Llyfni the coast turns to the N.N.E., or towards the entrance of Menai strait; the mountains receding from the shore, which then becomes a low shingle beach, and so continues to Belan point.

Dinas Dinlle, a small but remarkable hill, 110 feet high,  $2\frac{1}{2}$  miles to the southward of the strait, interrupts the monotony of this low shore; it is the site of an old fortress, as its name implies, the general form of which may still be distinctly traced. From the sea it has the appearance of a cliff.

One mile and a half to the southward of Belan point the coast rises into ridges of sand-hills, which continue to that point; the low-water shore, however, remains as before, coarse shingle with large stones here and there, and some off-lying patches. One of these, the Arianrod, bears S.W. by W.  $\frac{1}{2}$  W. from Dinas Dinlle, it is three-quarters of a mile from the beach, and is uncovered at low-water. To avoid it, keep the tower on Llanddwyn island to the eastward of N.  $\frac{1}{2}$  E., and Rivel mountain to the southward of S.W., within which limits no stranger should venture, or into a less depth than 5 fathoms.

Several small streams empty themselves into Carnarvon bay, the largest of these is the Llyfni, before alluded to.

## MENAI STRAIT.

## SOUTH-WEST ENTRANCE.

**LLANDDWYN ISLAND,\*** the outer northern point of the south-west entrance to Menai strait, lies off the south-western point of Anglesea island; it is two-thirds of a mile long, is joined to the shore at low-water, and is principally composed of rocks which rise from 60 to 80 feet above high-water. There are several large rocks off its points, which those who are acquainted with the place may pass close to, or within, but as some sunken rocky patches also lie in the vicinity of the island, it is more prudent to give the latter a good berth.

**LIGHT.**—On the south-west or outer end of Llanddwyn island are two towers painted white, which are useful as beacons to vessels approaching the bar. The northernmost, known as the large tower, with a flagstaff, exhibits a *fixed red* light, elevated 50 feet, and should be seen at the distance of about 5 miles in clear weather between the bearings S.E.  $\frac{1}{4}$  S. and N.E.  $\frac{1}{4}$  E.

**Signals.**—The commercial code of signals is kept at the large tower, and vessels wishing to communicate will be answered therefrom. A *black* ball is hoisted at the pilot's house as long as there is 10 feet water on Carnarvon bar.

**Rocks.**—On the south-east side of Llanddwyn island, just under the small tower, is a convenient little inlet, called Pilot's cove, where boats may obtain shelter under circumstances of emergency, but great caution should be observed in running for it on account of the rocks and shoal patches lying off this end of the island.

The western rock, with 2 feet over it, lies S.S.W.  $\frac{1}{4}$  W. 3 cables from Llanddwyn lighthouse; the southern rock, with 3 feet over it, lies S.  $\frac{1}{4}$  E., half a mile from the same point; while the eastern rock, awash, lies E.S.E.,  $1\frac{1}{2}$  cable from Llanddwyn low tower. They are each marked by a *green* nun buoy lying a short distance to the westward.

Holyhead mount, showing within the high-land of Rhoscolyn head and well open of Aberffraw point, bearing N. by W.  $\frac{1}{4}$  W., clears the above rocks by one mile to the westward.

Close off the eastern point, towards the north-east end of Llanddwyn, is a rock which has  $5\frac{1}{2}$  feet over it at high-water; it is marked by an iron perch surmounted by a cage, for the guidance of vessels of 6 or 7 feet draught taking the ground on the sand within it.

**ABER-MENAI POINT.**—The south-western entrance to Menai strait is bounded at high-water by the low shingle points of Aber-menai

\* See Admiralty chart of Menai strait, No. 1,464; scale,  $m = 2.95$  inches.



and Belan, which lie nearly north-east and south-west of each other, and  $1\frac{1}{2}$  cable apart. The rapid tide stream between the points keeps them steep, and the channel is, consequently, nearly as wide at low-water as at high-water.

Aber-menai point, lying about 3 miles to the south-east of Llanddwyn island, is at high-water a narrow strip of sand,  $1\frac{1}{2}$  mile in length, but at low-water an extensive flat of sand is left dry, both to seaward and on the inner or strait side of it, with some freshwater streams intersecting the latter. The removal of the boulders which faced the outer shore of this point has enabled the sea to make a breach through it half a mile within its eastern extremity; the taking away of these boulders is now, however, prohibited. At the extreme point, near the ruins of the ferry-house, is a small, white, powder magazine, which is at times used as a mark for running over the bar.

**BELAN POINT**, on the south side of the entrance, is a range of low sand-hills backed by marsh lands, from which the water has been banked out, and there is also within it, as upon the opposite side, an inlet of mud and sand, with a branch of the small river Forhyd running through it. On Belan point is an amateur dockyard and fortress, the summer residence of lord Newborough, the proprietor; the sheers and flag-staff on which are useful sea-marks.

**South Sands.**—From Belan point the South sands dry out at low-water to the westward for about  $1\frac{1}{4}$  mile, with an average breadth of a quarter of a mile, and then, as a shallow, with from 2 to 6 feet over it, extends for half a mile farther to Carnarvon bar. The highest portion of the bank, which is about  $1\frac{1}{2}$  mile from Belan point, has 9 feet over it at high-water springs.

**North Sands.**—The North sands occupy a considerably larger space, and, though much broken up, have a general triangular form. Their southern six-feet boundary has a westerly direction from Aber-menai point for upwards of one mile, and so far is steep-to; for the outer third of that distance it consists of the Mussel bank, a hard stony shelf which has a depth of 13 feet over it at high-water springs; the margin of the sand then trends north for a short distance, when it again holds westerly, and, at  $2\frac{1}{4}$  miles from Aber-menai point, bends round as a hooked spit towards the South sands, with which it is connected by Carnarvon bar. Between Aber-menai point and Llanddwyn island, the sands dry off at low-water with varying breadth, about midway they project out for three-quarters of a mile, and two cables farther off, a large detached mass, which has 11 to 14 feet over it at high-water springs, and is generally known as the North sand, extends S.W. by W. to  $1\frac{1}{2}$  mile from the coast. The spit of the North sand and the bar are steep-to.

**Fairway Buoy.**—In Carnarvon fairway is a *black* pillar buoy surmounted by staff and globe; it lies in  $7\frac{3}{4}$  fathoms,  $2\frac{3}{4}$  miles S.W. by S. from Llanddwyn lighthouse, and  $1\frac{1}{4}$  mile W. by N. from the *black* buoy on Carnarvon bar.

**CARNARVON BAR**, the outer limit of which is nearly  $2\frac{1}{4}$  miles from Aber-menai point, connects the North and South sands; at low-water spring tides it is  $1\frac{1}{2}$  cable wide, a quarter of a mile in length, and the least depth over it is 7 feet; the bar is, however, subject to change, and the positions of the buoys, which mark the best water, are altered accordingly, the relative positions of the fairway and bar buoys, on the bearings E. by S. and W. by N. from each other, being maintained. The outer, or bar buoy, a *black* can, is placed outside the bar, and should be left close to on the port hand when entering; and then two *red* buoys, marking the line of the bar, are to be left close to on the starboard hand. Six cables within the inner of these *red* buoys, is a *chequered black* and *white* buoy in 6 feet, the South sand having grown out towards this patch; it must also be left on the starboard hand entering. Six cables farther in is a *black* buoy at the west end of the Mussel bank; and on the highest part of this bank, which is near its eastern end, is a wooden perch 20 feet above high-water; these must be left on the port hand. Seven cables within the perch is Aber-menai point, separated from Belan point on the south by a channel  $1\frac{1}{2}$  cable wide, the strong tide which runs between them keeping them steep-to. Going towards Carnarvon, either from the bar or the Swellies, the *black* buoys are to be left on the port hand, and the *red* buoys on the starboard hand.

For information respecting the tides between Carnarvon bar and Menai bridge, *see* pages 111–113.

**CARNARVON.**—From Belan point to Carnarvon the distance is 2 miles; the outer edge of the sand-banks which extend more than half a mile from the Anglesea shore, on the north, is marked by three *black* buoys; off the Carnarvon shore, the low-water bank extends less than one cable, and is strewn with stones, the largest of which are gradually being removed by the harbour authorities.

Carnarvon is a borough, corporate and parliamentary, also the county town. The port is frequented by vessels of from 50 to 1,000 tons; the principal export is slates, of which upwards of 100,000 tons are shipped annually; there are large imports of timber, grain, and coals. The custom-house returns for 1882 were as follows:—Coasters, inwards, 2,409=171,635 tons; outwards, 2,439=177,869 tons; foreign, inwards, 2=187 tons; outwards, 4=484 tons. Number of vessels belonging to the port, 376 of 48,354 tons. The population in 1881 was 10,237. The town is in

railway communication with the slate quarries, and with all parts of the kingdom, by the London and North-western, Carnarvonshire, and Cambrian railways.

**Patent Slip.**—There is a patent slip adapted for vessels of 400 tons.

**Harbours.**—Extensive harbour works are in course of construction, commencing at the mouth of the river Seiont, and extending along the shore of the strait to the north-east. One basin is complete, and has 14 feet in its entrance at high-water. As part of the plan of these new works, the old pier, which was at right angles to the course of the main stream of Menai strait, and had injured the entrance to the river Seiont or inner harbour by allowing the sediment from the river to extend a considerable distance into the main channel under its protection, has been removed; and dredging has been carried on along the line of the new works, which, aided by the scour of the tide, has, to some extent, improved the entrance to the inner harbour. A low-water landing-place is being made.

Carnarvon inner harbour extends  $3\frac{1}{2}$  cables along the right bank of the river Seiont south-west of the town of Carnarvon; it will admit at high-water spring tides vessels drawing 13 feet, and at neaps those of 10 feet. Besides dredging at the entrance, it is intended to otherwise improve this important little harbour, from the wharves of which nearly the whole of the slates exported are shipped.

**LIGHT.**—A *fixed red* light is shown at the western side of the entrance to the tidal basin.

**Pilots.**—The pilots have dwellings upon Llanddwyn island, where they are always on the look-out.

**Anchorage.**—In moderate weather, vessels crossing the bar, and not having tide to proceed farther, may anchor 2 cables to the westward of the Mussel bank, provided they do not draw more than 11 feet.

There is good anchorage off Carnarvon wharves in 18 to 20 feet at low-water.

**Life-Boats.**—A life-boat, (which is occasionally used for surveying purposes,) is stationed at Carnarvon; and the Royal National Life-boat Institution has a boat outside the bar at Pilot's cove, Llanddwyn.

**DINORWIC.**—Continuing from Carnarvon to the north-eastward, the distance is  $3\frac{1}{4}$  miles to Dinorwic; the buoys marking the channel are moved as changes occur in the banks, and are under the care of the Carnarvon Harbour Board. Dinorwic, an out-port of Carnarvon, has a large trade in slate, it being the shipping-place for the Llanberis quarries.

**Carreg Ginnog.**—From Dinorwic to the Britannia bridge is  $2\frac{1}{2}$  miles; the low-water banks extend less than half a cable from the shore; the water in the channel is from 5 to 12 fathoms deep, with but one danger, Carreg Ginnog, a rocky bank one cable off the Carnarvon shore, and a mile to the south-west of the Britannia bridge, with 2 feet on it, and only 4 feet within it. Admiral Lord Clarence Paget erected a few years ago a colossal statue of Nelson on the Anglesea shore, one-quarter of a mile west of the Britannia bridge; the figure is 20 feet in height, on a pedestal of 22 feet, making it in all 42 feet above high-water, and, with a beacon which has been placed by the Carnarvon harbour trustees on the railway embankment, answers the purpose of an efficient clearing mark.

**The SWELLIES.**—Between the Britannia and Menai bridges the distance is about  $\frac{1}{10}$  of a mile; this reach, known as the Swellies, is much encumbered by rocks and islets, which, with its rapid tides, render the navigation dangerous to any but those with local knowledge and experience.

**Gored Goch.**—Britannia rock, on which is built the centre pier of the tubular railway bridge, divides the western entrance of the Swellies reach into two channels, the northern one with 28 feet in it, being 100 yards wide, and the southern, with 20 feet, 60 yards wide. Nearly one-quarter of a mile eastward of Britannia rock is Gored Goch, two small rocky islets having some houses and a flagstaff on them; they are surrounded by a salmon weir of solid construction to resist the force of the tide. The channel to the north of the islets is generally used by sailing vessels navigating the strait with a foul wind, it being the wider, and the curve in it enabling them to tack advantageously.

**Cribbin and Swelly rocks.**—Between Gored Goch and the south shore is Cribbin rock, which is separated from the rocks off the former by a very narrow channel; and between the rock and the south shore is a channel 35 yards wide with 9 feet in it. For one-sixth of a mile east of Gored Goch the strait is clear for the same distance across, and then occurs Swelly rock, which has 14 feet over it at high-water; the main channel, between it and the Carnarvon shore, being nearly 50 yards wide with 20 feet in it.

The statue of Nelson touching the north side of the north pier of the Britannia bridge leads close to the south edge of Swelly rock, therefore, when it is shut in, a vessel will be in the channel.

**Benlas and Weltog Islets.**—North of Swelly rock is a channel 40 yards wide between that rock and a small rocky islet named Benlas. To the north of Benlas is Weltog islet, connected by rocks and mud to the Anglesea shore; and east of Weltog is the island of Llandisilio, which has on it a church and is connected to Menai by a causeway.

**Carreg Halan and the Platters.**—East of Swelly rock the channel widens to one cable between Carreg Halan, a rock on the north side near the shore with one foot over it at high-water, and the Platters, with 20 feet over them at high-water, off the south shore, the position of the latter rocks being generally indicated by the tide-rip over them. The north pier of Britannia bridge open of the Carnarvon shore clears the Platters; and from thence to Menai bridge there are no dangers.

The sands at the south-west entrance of Menai strait being so liable to change, no directions have been given for entering beyond describing the general relative positions of the buoys and beacon which mark the bar and channel; and as the navigation from Carnarvon to the suspension bridge, a distance of 7 miles, is very intricate, particularly through the Swellies reach between the bridges, any directions here for that portion of the channel would also be out of place. It is seldom attempted without a pilot, and experienced men in that capacity can always be obtained.

**COAST.**—**Malldraeth Sands** occupy a deep inlet in the coast just to the northward of Llanddwyn island. At high tide the inlet appears as a large sheet of water, being more than one mile across from the island to the north point of the bay, and stretching more than three miles inwards, but at half-tide its bed of fine sand is uncovered.

A stream winding along the northern bank of the inlet is used occasionally by a few small craft.

Malldraeth bay is clear, and coasters may stop a tide in it, if the wind be from the eastward, and the weather fine.

From the west end of Llanddwyn island to Penrhos point, the southwestern extremity of Holyhead island, is N.N.W.  $\frac{1}{4}$  W.,  $13\frac{1}{4}$  miles. The whole of the intermediate coast is studded with dangers, and a stranger should not under any circumstances approach within 2 miles of it. Some of the off-lying rocks uncover, while others have so little water over them as to occasion a heavy sea in blowing weather. Those which lie most in the track of vessels working along shore are the following:—

**Aberffraw Reef**, a long narrow ridge of rocks projecting from Aberffraw point, and uncovered for the most part at half-tide. To pass outside it, keep Penrhos point open of Rhoscolyn beacon.

**Carreg Coch** is a small rock, having 12 feet over it at low-water,  $1\frac{1}{2}$  mile from the shore. From Llanfaelog mill it bears W.  $\frac{3}{4}$  S., and from Rhoscolyn beacon S.S.E.  $\frac{1}{4}$  E.; there is a depth of 8 fathoms between it and the shore. To pass outside Carreg Coch, keep Llanddwyn large tower half a point open of Aberffraw point, bearing S.S.E.  $\frac{1}{4}$  E.; or keep the highest part of Holyhead mount open to the westward of Rhoscolyn church; the last-mentioned objects in line would clear the rock by only half a cable.

**Rhoscolyn Rocks, and Beacon.**—A circular beacon, painted with *red* and *white rings*, stands upon the largest of a cluster of rocks which lies detached from the south part of the bold and conspicuous headland of Rhoscolyn. The beacons rock is 3 cables from the head, and may be approached closely if necessary, but, as there is an overfall and a race of the tide a short distance without the outermost rock, it will be prudent to give it a good berth.

There is a channel between the inner rock and the head, but as the tides run rapidly through it, especially at springs, it should not be used. Just to the southward of the head is a convenient little boat cove, where landing may be effected when it would be dangerous to approach any other part of the shore. A *black* nun buoy lies in 7 fathoms outside a rock abreast the western point of this cove.

**Life-Boats.**—There are a few houses on the shore of the cove, which are inhabited by pilots and fishermen, and a life-boat is kept in readiness in case of any accident occurring in the adjacent bay of Cymmeran. A life-boat and rockets are also stationed at Rhosneigr  $2\frac{1}{2}$  miles to the south-eastward.

**Maen-piscar** is a dangerous rock,  $1\frac{1}{2}$  mile N.N.W.  $\frac{1}{4}$  W. from Rhoscolyn beacon, and three-quarters of a mile from the northernmost part of Rhoscolyn head; it is uncovered at the last quarter of the ebb, and from the first mill northward of Rhoscolyn it bears S.W. by W.  $\frac{1}{4}$  W. A vessel will be to the northward of the rock when the conspicuous little sandy bay of Penrhos is well open, and a good mark for sailing outside of it is to keep Llangwyffen or Aberffraw point open to the westward of Rhoscolyn beacon; when in line they lead within a cable of it.

**Carreg Hen** is another rock, which might be disregarded were it not that the sea occasionally breaks upon it. It lies S.S.W., 3 miles from Penrhos head; W. by N.  $\frac{1}{4}$  N., the same distance from Rhoscolyn beacon; and S. by W.  $\frac{1}{4}$  W.,  $4\frac{1}{2}$  miles from the South Stack lighthouse. This rock is very small, and has 5 fathoms over it at low-water springs, with 22 fathoms close to all round.

To pass half a mile within Carreg Hen, run with the inner part of the South Stack, in line with the low outer part of Penrhos point, bearing N.  $\frac{3}{4}$  E.; and to sail half a mile outside of it, keep the highest part of Holyhead mount in line with the north part of Penrhos head, N.E.  $\frac{3}{4}$  N. A vessel will be to the southward of the rock, when Rhoscolyn head is to the northward of E.  $\frac{1}{4}$  N.; and she will be to the northward of it when the sandy bay of Penrhos is well open, E. by N.  $\frac{1}{4}$  N.

Foul ground extends from Penrhos point for about one-eighth of a mile, and as there is also a tide race off the point, it should be given a good berth when rounding for Holyhead bay.

**ABRAHAM'S BOSOM.**—Between Penrhos point and the South Stack is a small bay named Abraham's Bosom where Liverpool tugs occasionally anchor with off-shore winds; it will also be found an advantageous stopping place for small sailing vessels, or steam-vessels of low power, during north-east winds when the tide is adverse for rounding the Stack. The best anchorage is in 7 fathoms over a sandy bottom, with the South Stack high light in line with Penlas rock, and the point on the south side of the bay bearing S.W. by S., distant half a mile.

**Tidal Streams.**—To the southward of Rhoscolyn the tide streams are weak, except near the land and off the points, but they acquire strength as the South Stack is neared. Inshore, the streams sweep round the bays, but at about one mile in the offing the ebb sets to the southward and the flood to the northward.

Before quitting Carnarvon bay, the seaman must be advised that if he is working up towards Carnarvon bar at night, he should not lose sight of the South Stack light, and on no account, even in fine weather, should he stand into a less depth than 10 fathoms. If he be to the southward of Menai strait, it will be equally prudent to keep Bardsey light in sight, so that by attending to these lights, he can never be at a loss in clear weather as to his position, but if there be too much haze to admit of the lights being seen the vessel should be kept in not less than 20 fathoms water.

**SOUTH STACK.**—The South Stack is a rocky islet lying off the north-west extremity of Holyhead island, with which it is connected by a chain suspension bridge. The islet is about 240 yards long, and 140 yards broad, steep-to on all sides, and elevated 140 feet above high-water.\*

**LIGHT.**—Near the west end of the South Stack stands the lighthouse, a circular stone building, 91 feet high, which, together with the attached residences, is painted white, and at an elevation of 197 feet is exhibited a *white light revolving every minute*; the brilliancy is of very short duration; the light is visible in clear weather at the distance of 20 miles.

**OCCASIONAL LIGHT.**—At 195 feet W. by S. from the South Stack main lighthouse, a *white light revolving once every minute*, is exhibited, during thick or foggy weather, in addition to the main light, at an elevation of 90 feet above high-water, between the bearings N. 4° E. and S. 53° W.

**Caution.**—This light is exhibited only during thick or foggy weather. When a fog is partial, it may happen that both lights will be visible, when, if they do not show simultaneously, they will appear as one light exhibited at irregular intervals.

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\* See Admiralty chart of Holyhead bay, No. 1,413; scale,  $m = 4.0$  inches.

**Fog Signals.**—During thick or foggy weather, a bell is sounded *once every fifteen seconds*, and a gun is also fired from the point within the North Stack *every ten minutes*.

Should the gun be from any cause temporarily disabled, rockets for the production of sound will be substituted, which, on reaching an elevation of 600 feet, will explode with a loud report *every ten minutes*.

**Signal Station.**—In approaching the neighbourhood of Holyhead, it will be useful to bear in mind that on the South Stack is a telegraph station, having direct communication with Liverpool; so that during daylight, either by the International (Commercial) Code, or Marryatt's code of signals, a ship being within signal distance may cause her name as well as any intelligence or request it may be expedient to communicate by those means, to be reported at the underwriters' rooms at Liverpool.

**A Telegraph cable** also crosses to Dublin.

In Carnarvon bay, the South Stack light may be seen over Penrhos point until it is intercepted by high land on the bearing N.  $\frac{1}{4}$  W.; a vessel having its extreme south ray in sight, will, therefore, be kept three-quarters of a mile off Rhoscelyn beacon, in 15 fathoms water, gravel, and shells; and  $2\frac{1}{4}$  miles off Aberffraw point, in 12 or 13 fathoms, or it may be in as little as 8 or 9 fathoms, as there is a small shoal patch at that distance. In Holyhead bay, the light is shut in by Holyhead mount, on a S.W. by W.  $\frac{1}{4}$  W. bearing.

As the South Stack lighthouse is an excellent point of departure, the following bearings and distances from it will be useful:—Carnarvon bay light-vessel, S.S.W.  $\frac{1}{4}$  W.,  $12\frac{1}{4}$  miles; Bardsey lighthouse, S.S.W.  $\frac{1}{4}$  W.,  $33\frac{1}{4}$  miles; Porth Dynlleyn point, S.  $\frac{3}{4}$  W., 22 miles; and Skerries lighthouse, N.E.  $\frac{1}{4}$  E.,  $7\frac{1}{2}$  miles.

**NORTH STACK.**—From the South Stack the coast trends N.E.  $\frac{3}{4}$  E. for  $1\frac{1}{8}$  mile, to a sharp point, steep to, with a large detached rock lying off it called the North Stack.

**Fog Signal Station.**—On the point within the North Stack is a fog signal station, consisting of three houses, and a flagstaff, surrounded by a wall, and the whole being white-washed forms a very conspicuous mark. From this station a gun is fired *every ten minutes* during thick or foggy weather.

**HOLYHEAD MOUNT.**—Between the Stacks the coast forms a bay bounded by the steep cliffs of Holyhead mount, or Pen Gyby, which is one of the most remarkable and useful objects on the borders of the Irish channel, being equally conspicuous from every direction. Its highest point is elevated 709 feet above high-water, and on its northern shoulder is one of a series of stations formerly used for telegraphing information to Liverpool.



The bay appears to be free of danger, but, as the ground is rocky, and the tidal streams are irregular, it cannot be recommended as an anchorage.

Off the north-west point of Holyhead island, rocky ground, with 3 to 5 fathoms over it, extends a little over a cable in a north-east direction.

**HOLYHEAD ISLAND and BAY.**—From the North Stack the coast bends suddenly to the eastward for about 2 miles to Ynys Wellt and Ynys Gyby points; between, and abreast these points, is Holyhead harbour.

**Porthnamarch.**—To the westward of Ynys Wellt is Porthnamarch, a small bay free of danger, where in fine weather a vessel may anchor to await the turn of the tide.

One and two-thirds mile S.S.E.  $\frac{1}{4}$  E. from Ynys Gyby is Penrhos, the eastern point of Holyhead, from which the irregular outline of the island trends south  $3\frac{1}{2}$  miles for Cymmeran bay, the southern entrance of the shallow strait which separates the island from Anglesea. At low-water the channel is in some places fordable; it is crossed by a road bridge at Trepont, and farther north by a road and railway viaduct, about two-thirds of a mile in length. The island is about  $6\frac{1}{2}$  miles long and from a half to 3 miles broad. From Penrhos to Carmel head, the north-eastern boundary of Holyhead bay, the distance, on a N.N.E.  $\frac{1}{4}$  E. bearing, is 6 miles; the shore is rather low to Church bay, where the cliffs increase in height, and are backed by Pengarn mount and the slopes in connection with it.

**NEW or REFUGE HARBOUR.\***—This important work which was begun in 1848, and opened by H.R.H. the Prince of Wales in August, 1873, is one of great magnitude. It is chiefly formed by an immense pier or breakwater of rubble-stone, extending seaward in three principal directions; the heel of the pier rests upon Soldier's point, the inner part of Ynys Wellt, from whence it projects N.E.  $\frac{3}{4}$  E. one-sixth of a mile, then E. by S.  $\frac{3}{4}$  S. rather more than half a mile, and then E.N.E. nearly half a mile to its termination, which is N. by E.  $\frac{3}{4}$  E. one mile from the lighthouse on the stone pier-head of the old harbour. The breakwater for the greater portion of its length has been formed in a depth of 7 and 8 fathoms at low-water; it affords partial shelter to a roadstead of 350 acres, and complete protection to a harbour of 260 acres.

The stone used in the construction of the breakwater was taken from the side of Holyhead mount, facing the harbour, and the quarry is a conspicuous feature in the land.

**Outer Platters.**—The approach from the roadstead into the refuge harbour is obstructed by the Outer Platters, some patches of foul ground lying about three-tenths of a mile N.  $\frac{3}{4}$  E. from Ynys Gyby point, with

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\* See Admiralty chart of Holyhead harbour, No. 2,011; scale,  $m=12\cdot0$  inches.

from 3 to 6 feet water upon them.\* Their north boundary is marked by two *black* and *white chequered* buoys, and to the southward is a *red* and *white chequered* buoy.

**Skinner Rock.**—An inner patch, named Skinner rock, having 9 feet over it, is marked by a *black* and *red chequered* buoy.

**Carreg Jordan**, or Ynys Gyby reef, with only one foot upon it at low-water springs, extends N.E. one cable from Ynys Gyby point, and with the Inner Platters, another small patch of rock with two feet over it at low-water, lying on the east side of Ynys Gyby point, and a short distance north of Holyhead pier, are both out of the general track of vessels. The northern limit of the reef is marked by two *black* buoys, and they will be cleared to the eastward by keeping an old square tower on the outline, in line with the lighthouse on the pier end, bearing S.S.W.

**HOLYHEAD OLD HARBOUR.**—The old or stone pier projects E.S.E 400 yards from the south end of Ynys Gyby, enclosing a space appropriated to the mail packets, and in which they always lie afloat. The depth in this portion of the harbour gradually increases to 12 or 13 feet abreast the old pier-head. A wooden jetty extends in an E.  $\frac{1}{2}$  S. direction 500 feet from the stone pier-head, and affords an increased depth of water of from 14 to 16 feet alongside.

**Graving Dock.**—Another pier on the opposite side, extending in a N.N.E.  $\frac{1}{4}$  E. direction, shelters the harbour from the south-east, and forms also one side of a graving dock 307 feet long, with 62 feet 9 inches width of entrance, and having a depth over the sill at high-water of 15 feet, but two feet must be allowed for the blocks. At the inner elbow of the northern pier is a gridiron 350 feet long and 35 feet wide, with a depth over it at high-water springs of 15 feet. The establishment which is maintained at Holyhead for the service of postal communication with Ireland, includes everything necessary for keeping the packets in the most efficient state of equipment.

**HOLYHEAD INNER HARBOUR** has been recently excavated by the London and North-western Railway Company, who have deepened one half of the mud inlet, or pill, which formerly existed, and reclaimed the other half, thus forming a harbour 2,000 feet in length and 500 feet in breadth, with a depth of 12 feet at low-water, from which their steam-vessels run to Dublin and Carlingford. Quays formed of concrete surround the harbour, and numerous hydraulic cranes and capstans facilitate the discharge and taking in of cargo.

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\* These and other described depths in Holyhead harbour are as shown on the Admiralty chart, No. 2,011, where the soundings are reduced to the level of low-water of equinoctial springs, which is about two feet lower than that of ordinary spring tides.

**Graving Dock.**—There is a graving dock on the south side of the Inner harbour of the following dimensions :—Length extreme, 401 feet 4 inches ; width of entrance, 70 feet ; depth on sill at high-water of ordinary springs, 21 feet.

**LIGHTS.**—On the outer end of the refuge harbour breakwater a *red* light with strong *flashes* at intervals of *seven and half seconds* is shown from an elevation of 66 feet above high-water. The light between the flashes at the distance of 3 or 4 miles appears *fixed*, but the flashes may be seen in clear weather at the distance of 13 miles. Vessels passing this light should keep one cable eastward of it.

**Fog Signal.**—During thick or foggy weather a bell is sounded *three times* in quick succession at intervals of *fifteen seconds*.

From a tower at the end of the wooden jetty, old harbour, a *fixed white* light is shown from an elevation of 20 feet.

**Fog Signal.**—A bell is sounded during foggy weather.

A small *fixed red* light is exhibited from the tower at the stone pier-head, between the bearings S.W.  $\frac{3}{4}$  S. and S.S.W.  $\frac{3}{4}$  W. ; the former bearing clears all dangers on the east side of the bay, and the latter serves the same purpose for the breakwater and the Platters.

At the head of the fish jetty on the starboard hand, entering the inner harbour, is a *fixed red* light, 16 feet high ; and abreast it, on the point of Turkey shore quay, is a *green* light, elevated 10 feet ; these two lights mark the entrance to the inner harbour.

Should a vessel be seen approaching the old harbour at night when the mail packet is swinging or the entrance blocked, a *red flash* light will be burnt on the jetty and the fog bell sounded ; a *green flash* light will be shown when the harbour is clear.

The following rocks and foul ground lie in the approach to Holyhead from the northward and eastward.

**Langdon Ridge**, situated between Holyhead breakwater and the Skerries, is a rocky ridge with 7 to 10 fathoms water, three-quarters of a mile in length W. by N. and E. by S., and  $1\frac{1}{4}$  cable in breadth. From its shoalest part, 7 fathoms, Carmel head bears E. by N., 2 miles ; Rhyddlad mill, S.E.  $\frac{1}{2}$  E.,  $2\frac{3}{4}$  miles ; and the Skerries lighthouse, N.E. by N.,  $2\frac{1}{4}$  miles. Strong tide-rips mark this ridge both on the flood and ebb.

**Bolivar, or Fenwick Rock**, with 9 feet upon it, lies N.W.  $\frac{1}{2}$  N. two-thirds of a mile from South Porthwan point, the south-western boundary of Church bay. A *black* and *white vertically striped* conical buoy is moored close to the westward of it in  $6\frac{1}{2}$  fathoms water, N.E. by E.  $\frac{1}{2}$  E.,  $1\frac{9}{10}$  mile from the end of the breakwater.

**Clipera Rocks** extend outward from Clipera point three-quarters of a mile. The *black bell* buoy on their south-west side lies in  $5\frac{1}{2}$  fathoms,

with Skinner's monument, in line with the Stone pier-head lighthouse, bearing S.W. by W., and the lighthouse on the end of the breakwater, W. by N.  $\frac{1}{2}$  N., distant three-quarters of a mile. Two cables north of this buoy is a shoal patch of 21 feet, and another of 18 feet N.N.E.  $\frac{1}{2}$  E.,  $1\frac{1}{2}$  cable.

Penrhos Cot, seen to the westward of Tyn point, bearing S.S.W.  $\frac{1}{4}$  W., leads inside an 18 feet and over a 17-foot patch of Clipera rocks; a better mark for leading westward of these rocks, is George mill, in line with the lighthouse at the end of the wooden jetty, bearing S.W.  $\frac{1}{4}$  S.

**Stag Rock** is a small pinnacle with 13 feet upon it, lying E. by N.  $\frac{1}{2}$  N., 2 cables from the jetty lighthouse. The marks for it are, Pen Towyn cot, in line with the west end of Ynys Pibeo (upon which there is a ruin), bearing S.S.W. southerly; new church spire, in line with the arch (built to commemorate the visit of His Majesty George IV. to Wales) on the inner part of the stone pier, W.  $\frac{1}{4}$  N.; and Skinner's monument, in line with a sudden dip in the high wall on the southern pier, W.S.W. The least deviation from these lines of bearing will clear the rock. Skinner's monument in line with the jetty light leads westward.

The ground outside the old harbour along the south-eastern shore is all foul, and the rocks and sands are uncovered at low-water to a considerable distance. The same remark applies to all the intermediate coast to as far as Church bay.

**TIDES.**—It is high-water, full and change, at Holyhead pier, at 10h. 11m.; the rise of ordinary spring tides is 16 feet, and of neaps  $12\frac{1}{2}$  feet; neaps range 9 feet.

**Holyhead Race.**—One mile to the westward of the South Stack the flood stream, making rather before low-water at Holyhead old pier, sets E. by N., and then more easterly into the bay. At the above distance, the influence of the race is felt; the stream runs 5 knots at springs, and 3 knots at neaps, causing a heavy sea when the wind is from the northward. The ebb of the same strength sets in a nearly opposite direction.

The ebb, or westerly going stream, runs 9 hours out of 12 past the refuge harbour and on the south-west side of Holyhead bay, a fact which must be borne in mind when working into or out of the bay.

The race extends  $1\frac{1}{2}$  mile off shore, the most turbulent portion of it being between the North and South Stacks. Winds from north to north-west cause the worst sea, and even in those from south to south-west, concurrently with the height of the springs, it is dangerous to small vessels. With easterly winds, however, there is generally smooth water. The position of the highest sea in the race being N. by W. nearly half a mile from the Stack lighthouse, over a prong of 10 fathoms which projects in

that direction, it will be avoided by keeping Skerries lighthouse to the eastward of N.E. by E.  $\frac{1}{4}$  E.; but a prudent seaman will always keep well outside it in bad weather.

**Directions.**—Sailing into Holyhead refuge harbour is extremely simple, and unattended with any risk. In rounding the breakwater, however, do not stand within one cable of its extreme end, as a strong tide, setting to the westward for 9 hours out of the 12, strikes hard upon it and might place the vessel in difficulty in case of a variable wind. Having rounded the breakwater, steer to the W.S.W., between it and the Outer Platters, leaving the buoys marking the edge of the latter on the port hand, and anchorage may be taken up over any portion of the harbour at a moderate distance from the breakwater, or the bounding shore. The bottom is hard, overlaid by a coating of silt; but, as the water is at all times smooth, the holding capabilities are sufficiently good.

Small vessels should proceed to the western portion of the harbour, the outer part being reserved for large ships.

There are passages between the Platters and Ynys Gyby, but a stranger should not use them.

When closing the harbour at night, round the *red* light of the breakwater not nearer than one cable, and, having the *red* light of the old harbour bearing S.S.W.  $\frac{1}{2}$  W., the vessel will be in a fairway for either harbour.

Vessels entering the refuge harbour should have both anchors in readiness for letting go, with from 30 to 60 fathoms of chain ranged, according to the force of the wind, and should be careful not to take up anchorage in the entrance, or in the fairway of the entrance along the breakwater, in order to avoid the penalty of being obliged to shift berth.

Vessels disabled, or without ground tackle, may be laid on a beaching slope on the south side of the harbour, which has been prepared for the purpose. The rocky points bounding this slope are marked by a *black* beacon perch to the westward, and by a *black* buoy to the eastward; there is also a *black* beacon perch east of the buoy marking the end of the rocks west of Ynys Gyby.

Bound for Old harbour,\* and having passed the breakwater, be careful to avoid Ynys Gyby reef, and the Inner Platters by keeping the square tower on the outline in line with the lighthouse on the end of the pier, bearing S.S.W. In making towards the harbour from the east side of the bay, the buoys already specified will mark the dangers, but should they be out of place, keep George windmill open to the westward of the same

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\* Directions for Old and Inner harbours are from information forwarded by Rear Admiral J.F.C. Mackenzie, Queen's harbour-master at Holyhead, 1875 and 1882.

lighthouse, bearing S.W.  $\frac{1}{2}$  S., to clear Fenwick rock; and Penrhos cot, open to the westward of Tyn point, S.S.W.  $\frac{1}{2}$  W., or George mill, in line with the lighthouse at the end of the wooden jetty, bearing S.W.  $\frac{1}{2}$  S., to clear Clipera rocks.

Vessels bound for the inner harbour should have both bower anchors clear, and the end of a good warp ready; round the jetty with good steerage way, and keep it close aboard on a W. by N.  $\frac{1}{2}$  N. course, to avoid dropping on the rocks to the southward, and when well within the packet moorings act as circumstances require, passing between Turkey shore quay on the port hand and Fish jetty on the starboard hand, into the harbour.

The depth of water at the entrance of Old harbour at low-water spring tides is about 18 feet.

If possible to keep off, no vessel should run for the inner harbour at night, as the mail packets and London and North-western Railway Company's steamers arrive and sail between 10 p.m. and 4 a.m.

Several anchorages in Holyhead bay, such as Church bay upon the eastern side, and Holyhead road, a quarter of a mile off the inner pier lighthouse, were formerly much frequented with certain winds, but the establishment of the refuge harbour renders this risk unnecessary.

**Pilots and Tugs.**—There are six licensed pilots belonging to the port. Several Liverpool tugs are generally in waiting, their charges being in each case by special agreement.

**Storm Signal.**—The storm drum is hoisted on a staff near the watch-house, by telegram from London; particulars of the expected gale being posted in a window of the watch-house.

**Life-Boat, &c.**—At the coast-guard station, a rocket apparatus is kept ready for service; and upon the south-west shore of the refuge harbour a life-boat is stationed, with rockets, belts and lines.

The principal low-water landing-place is near the life-boat house, with others on either side of it. There are hydrants for the supply of water, and within the old harbour there are similar facilities for watering placed at intervals along the pier.

**Holyhead.**—Besides Her Majesty's mail packets, there are other steamers plying daily with Ireland in connexion with the railway company. The town is much frequented in the summer for sea bathing. It is distant by rail 261 miles from London, 87 from Chester, 30 from Carnarvon, 28 from Beaumaris, and 60 from Dublin.

The population in 1881 was 8,543.

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## CHAPTER IV.

## SKERRIES TO GREAT ORME HEAD.

## VARIATION IN 1884.

Off the Skerries,  $21^{\circ} 5'$  West. Beaumaris bay,  $20^{\circ} 35'$  West.

**SKERRIES.\***—The Skerries are a cluster of dark-coloured rugged islets, seven in number, with some detached rocks, lying out  $1\frac{3}{4}$  mile from Carmel head, the north-east point of Holyhead bay. They extend about half a mile E.N.E. and W.S.W., and are separated from each other at high-water by narrow irregular gullies. The highest islet is about one-third the extent of the group from its western end.

**LIGHTS.**—Upon the highest islet of the Skerries stands a circular white light-tower, 75 feet high, with out-building; it shows a *fixed white* light 117 feet above high-water, visible at the distance of 16 miles in clear weather; it is masked between the bearings N.N.W.  $\frac{1}{3}$  W. and N.W.  $\frac{1}{4}$  N., covering the East Platters rocks (but the reflection of the light from the lantern will still be seen); and in addition a *red* light is exhibited from a window 50 feet below the lantern, between the bearings W. by S.  $\frac{1}{2}$  S. and W.  $\frac{1}{2}$  N., covering Ethel and Coal rocks; the former bearing leading about 2 cables to the northward of the Ethel, and the latter the same distance to the southward of Coal rock.

**Fog Signal.**—A fog siren is sounded in thick or foggy weather, giving *three blasts* in quick succession *every three minutes* in the following manner:—*Two high notes* and *one low note*, each of *two seconds* duration, at intervals of *two seconds*, followed by an interval of *one hundred and seventy seconds*.

**West and East Platters.**—The Skerries are surrounded by dangers. Two rocks, named the West Platters, lie half a cable from the westernmost islet, and S.W.  $\frac{1}{4}$  S., two cables from the lighthouse. At low-water, one rock is dry, and the other has 3 feet over it. The East Platters, a reef of greater extent, lies between the Skerries and Carmel head,

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\* See Admiralty charts, Holyhead bay, No. 1,413; scale,  $m = 4.0$  inches: and Holyhead to Liverpool, western sheet, No. 1,170a; scale,  $m = 1.0$  inch.

S.E. by S., half a mile from the lighthouse; it is dry at low-water springs, although there are from 14 to 19 fathoms close to it.

There are two distinct patches of rocky ground, with 8 and 9 fathoms over them, nearly midway between the East Platters and Carmel head, and other patches, named Carmel rocks, with  $8\frac{1}{2}$  to 5 fathoms upon them, lie W.  $\frac{3}{4}$  N. and west, from half to three-quarters of a mile off Carmel head. The rapid tide streams cause heavy overfalls at the East Platters and the patches inshore of that reef.

**African Rock**, with 15 feet upon it, is N.N.W.  $\frac{1}{2}$  W.,  $2\frac{1}{2}$  cables from the lighthouse, and lies with the latter object, in line with Pengarn hill, bearing S.S.E.  $\frac{1}{2}$  E.; its position is also generally indicated by an overfall; there are from 8 to 12 fathoms close to the rock. About half a cable to the northward of the east end of the Skerries is another small sunken rock.

**Directions.**—On account of the rapidity of the tides the distance of one mile is quite near enough to approach the Skerries while rounding them, especially when the wind is variable and of uncertain strength.

The suspension bridge at the South Stack, seen directly over the North Stack, bearing S.W.  $\frac{1}{4}$  W., leads nearly midway between the West and East Platters, and clear by one cable of the eastern end of the Skerries. The two Stacks in line, S.W.  $\frac{3}{4}$  W., leads  $1\frac{1}{4}$  cable within the East Platters. Llanlana head, in line with the beacon on the West Mouse, bearing E. by S., will clear the East Platters to the southward, but rather closely; a better mark is the Middle Mouse in line with the West Mouse, E.  $\frac{1}{2}$  S., as it clears it by more than two cables.

The passage outside the Skerries is generally to be preferred, except in strong off-shore winds, when the inner passage may be taken safely by keeping well over towards the islands, or towards Carmel head.

**CARMEL HEAD** is bold, and is conspicuous from its advanced position; the land slopes with some degree of regularity towards it from Pengarn hill, which is S.E. by S.,  $1\frac{1}{2}$  mile from the head. Just above the easternmost projection of the head are two *white* conical beacons, 30 feet high, which, in line with each other, and with the beacon on the West Mouse, mark the position of Coal rock.

**Tides.**—The tide at Carmel head turns from one to  $1\frac{1}{4}$  hour before the stream outside the Skerries.

**WEST MOUSE**, a small islet, 100 yards across, with its summit about 20 feet above high-water, is S.E. by E.  $\frac{1}{2}$  E.,  $1\frac{2}{3}$  mile from the Skerries lighthouse, and N.E.  $\frac{1}{2}$  N.,  $\frac{2}{3}$  mile from the nearest beacon on Carmel head. A cone with a globe head painted *white* stands on its summit, and assists, as before observed, in pointing out the position of Coal rock. The West Mouse is generally bold to; on its north side a



berth of one cable should be given it; a rock of small extent, with 15 feet water over it, and 5 to 6 fathoms around, lies with the islet beacon bearing S.E., and distant 90 yards from the shore; and a sunken ledge with 4 and 5 fathoms over it projects a quarter of a mile from the islet in a W. by S. direction, upon which, during the ebb, there is an overfall that is dangerous to small craft.

**COAL ROCK**, from its outlying position the principal danger on this part of the coast, is not more than 20 yards across, and shows at low-water springs; 50 yards off it in all directions there is a depth of 5 fathoms over a rocky bottom, and 10 and 12 fathoms prevail at the distance of one-quarter of a mile. The bottom to the south-west consists of gravel.

Coal rock is East,  $2\frac{1}{2}$  miles from the Skerries lighthouse, and N.E.  $\frac{1}{3}$  N.  $1\frac{2}{10}$  mile from the West Mouse; and from it Carmel head beacons and the beacon on the West Mouse appear in line, bearing S.W.  $\frac{1}{3}$  S.

**Buoy.**—A *black* conical buoy, with staff and globe, lies in 12 fathoms,  $1\frac{1}{2}$  cable outside or to the northward of the rock.

**ETHEL ROCK.**—A little more than 2 miles E. by N.  $\frac{1}{8}$  N. from the Skerries lighthouse, and six-tenths of a mile from Coal rock, is the Ethel, a shallow spot of 3 fathoms on a rocky bank of from 5 to 10 fathoms, one-quarter of a mile in extent.

**Buoy.**—On the north side the Ethel is guarded by a *black* can buoy lying in 11 fathoms at the edge of the shoal.

In the absence of the buoy, the Ethel will be cleared on the north-west, when the South and North stacks are in line, bearing S.W.  $\frac{2}{3}$  W.; and half a mile on the north-east with Lynus lighthouse, in line with Middle Mouse, bearing S.E. by E. A wider mark for clearing this rock on the north-west, is the South Stack lighthouse, touching the eastern part of the Skerries, S.W.  $\frac{1}{3}$  W.

**VICTORIA BANK**, in the line between Coal rock and Camlyn point, but nearer to the latter, has  $1\frac{1}{2}$  fathom over it; it lies E.  $\frac{1}{8}$  S.,  $1\frac{1}{10}$  mile from the West Mouse, and N.N.W.  $\frac{2}{3}$  W., two-thirds of a mile from the flagstaff on Camlyn point; and from it, Kemmaes windmill is in line with the beacon on Harry Furlong reef, bearing S.E.  $\frac{1}{8}$  S.; and the summit of Pengarn hill shows over the cliff to the north of Llanrhwydrys church, S.S.W.  $\frac{7}{8}$  W.

**Buoy.**—A *black* can buoy lies in 9 fathoms close on the north-east side of Victoria bank, which is also generally marked by the ripple of the tide passing across it.

**COAST.**—The coast from Beacon point, Carmel head, extends E. by S. for one mile to the small and rock-encumbered bight named Henborth bay, which is barely a quarter of a mile in depth, and does not afford any

anchorage, the middle of it being occupied by a rock named Maenforchog, which dries at low-water. In off shore winds, however, vessels may anchor for a tide without the rock in 8 fathoms.

From Llanrhwydrys point to Camlyn point is E.  $\frac{1}{2}$  N., three-quarters of a mile; the intermediate coast is very foul. Half-way between the points, at 2 cables off shore, is Stag rock, which is seldom covered; it is steep to on the outside, and being nearly on the line between Carmel head and Camlyn point, is out of the proper navigable track.

**HARRY FURLONG REEF.**—Camlyn point is low and narrow, with a flagstaff at the end of it; a low-water projection named Harry Furlong reef, extending nearly one-quarter of a mile to the N.N.E. from the point, forms a considerable obstacle to vessels navigating in-shore; it projects farther than any of the ledges between Carmel head and point Lynus, and has consequently been the cause of frequent loss.

**Beacon.**—The outer portion of the ledge, which is its highest part, is covered at four hours' flood, and is marked by a cone beacon, painted with *black* and *white* rings, and surmounted by a staff with a triangular head.

**Directions.**—Coal rock, as before observed, has its position marked by Carmel head beacons and the beacon on the West Mouse being in line, bearing S.W.  $\frac{1}{2}$  S.; its distance from the West Mouse is about  $1\frac{2}{10}$  mile.

Rounding the Skerries by night, and intending to pass outside Ethel and Coal rocks, keep within the limit of the white light, so as not to bring it to the westward of W.S.W., until Lynus light comes in sight, bearing S.E.  $\frac{1}{2}$  E., which will place the vessel upwards of one mile and a half outside the rocks. If Lynus light be kept in sight it will lead half a mile outside the Middle Mouse in 22 fathoms, rocky bottom, and upwards of 2 cables outside the East Mouse in 10 fathoms, gravel; but a safer plan is, from a position outside Coal rock to steer about S.E. by E. with Lynus light half a point on the starboard bow, as it will insure a safe offing, and render a vessel more independent of the set of the tide stream.

Coal rock will be cleared to the south by night, so long as a vessel does not open the *red* light from the Skerries; and the South Stack light touching Carmel head, bearing S.W. by W.  $\frac{1}{2}$  W., is also a mark for leading to the south-east of the same danger.

Point Lynus lighthouse on with the Middle Mouse, bearing S.E. by E., is, as before observed, the day mark for leading half a mile north-east of Ethel and Coal rocks, from whence a course may be shaped for a fair offing abreast point Lynus.

Llanbadrig church, standing on the eastern point of Kemmaes bay, one-third of a point open of Wylfa head (the western point of the bay), bearing S.E. by E.  $\frac{1}{4}$  E., leads between Coal rock and Victoria bank ; it also leads one-third of a mile outside Harry Furlong reef.

The west mill near Holyhead, touching Carmel head, bearing S.W.  $\frac{1}{8}$  S., leads midway between Coal and Ethel rocks ; the telegraph station near Pen Gyby, on with the same head, S.W. by W.  $\frac{1}{4}$  W., or the latter on with the western side of the West Mouse, S.W. by W.  $\frac{1}{8}$  W., leads one-quarter and one-third of a mile to the south-eastward of Coal rock.

The channel within the West Mouse should be used only by day, and even then great care is necessary on account of the rapidity of the tides and the consequent danger of the wind falling light, &c. The mark from abreast Carmel head is, Llanliana head just open of Wylfa head, bearing E.  $\frac{1}{8}$  S., until Llanrhwydrys church has been brought in line with the cliffy point to the northward of it, S.  $\frac{3}{4}$  E. ; then steer E. by N., with Carmel head beacons right astern, and pass between Victoria bank and the beacon on Harry Furlong reef. This beacon in line with Llanliana head, E.  $\frac{1}{8}$  S., is also a good mark for this channel.

**Tidal Streams.**—The flood stream sets direct from the Skerries towards Coal rock E.  $\frac{3}{4}$  S. nearly, and then parallel with the coast to abreast point Lynus. In-shore the stream runs with great rapidity, and adds considerably to the danger of using the inner passages. Near the land it turns at the time of high and low-water by the shore.

**CAMLYN BAY**, skirted at its head by a shingle beach, affords excellent shelter with off-shore winds between W. by N., through south, and S.E., in 4 to 6 fathoms, sand, with the flagstaff bearing about N. by W.  $\frac{1}{4}$  W. ; this position is within the stream of tide. The bay is visited by a few coasters with coal, and the Liverpool pilot-vessels use it as an anchorage in southerly gales, but it should be promptly quitted on a change of wind to the eastward, for a strong breeze from that quarter, with its attendant sea, would render it difficult for a vessel to beat out and weather Harry Furlong reef.

**Life-Boat.**—A life-boat, stationed at the village of Camlyn, has been very successful in the rescue of life and property from the foul shores adjoining.

**Mill Bay**, just to the eastward of Camlyn bay, is no stopping-place, as it is full of sunken rocks and without a free beach.

**KEMMAES BAY**, contained between Wylfa head, three-quarters of a mile to the eastward of Mill bay, and Llanbadrig point, with the church within 150 feet of the cliffs, is three-quarters of a mile across, and half a mile deep, and affords excellent shelter in off-shore winds from west,

south about, to east. The depth of the anchorage is, like that in Camlyn bay, about 5 or 6 fathoms, sand, and is equally clear of the stream of tide. The sides of the bay are high and rocky, and the low-water boundary consists of shelving ledges. Half a cable N.W. by W. from the low-water extreme of Llanbadrig point is a rock having 6 feet over it at low-water springs; there is 6 fathoms on the seaward side of the rock, and 4 fathoms between it and the point. One-quarter mile outside the line of the points there is a depth of 14 to 19 fathoms, sand; within that line the depth decreases rapidly. The whole of the bay has a bottom of fine sand; the position of anchorage in it should be determined by the wind, the prevailing directions being between north-west and south.

The village, creek, and pier of Kemmaes, are in the south-east part of the bay. The pier, built by local subscription, affords shelter for a dozen small craft; at its head is a depth of 9 and 10 feet. An extension of this small harbour has been projected, which would add to its safety as well as capacity, and special facilities exist for such an improvement.

**Life-Boat.**—A life-boat is stationed at Kemmaes, as well as rocket apparatus.

**CAUTION.**—It is necessary while using Kemmaes bay as an anchorage to guard against the wind shifting suddenly to the northward. Such a change is of not unfrequent occurrence, and is generally preceded by a swell from that quarter. The safety of a vessel thus suddenly caught must depend on her riding out the gale, or, should she part, on her being able to beach in the partially sheltered creek of Wylfa, under Wylfa head. To strand upon the rocks to leeward would be instant destruction.

**MIDDLE MOUSE** is N.E. by E.  $\frac{1}{4}$  E. nearly one mile from Llanbadrig point, and half a mile out from Llanlana head, the nearest point of the mainland. From the Middle Mouse, the West Mouse is W.  $\frac{3}{4}$  N.,  $4\frac{1}{2}$  miles, and point Lynus, S.E. by E.,  $5\frac{1}{2}$  miles. This islet is 23 feet above high-water, 200 yards long from north-west to south-east, 80 yards broad, and bold-to all around; it is nearly divided towards its western end by a gully, which gives it the appearance of two islets when seen from north-eastward.

The channel within the Middle Mouse has a depth of 20 fathoms. Point Lynus, kept open of the intervening land, leads through it, but it must be remembered that during springs the rapidity of the tide stream produces dangerous overfalls, especially near the islet.

Point Lynus light is masked or shut in landward of the bearing S.E.  $\frac{1}{4}$  E.; kept in sight it will lead half a mile outside the Middle Mouse; the shading of the light is also a good clearing guide for all the coast westward of it.

**COAST.**—From Llanbadrig point, which may be readily known by the church standing near it, the coast trends E.  $\frac{1}{4}$  N. for nearly one mile to Llanlana head, the northern extremity of Anglesea. The head is steep-to, with a small opening bounded by high rocks, named Llanlana cove, close on the west side of it. From the head, the coast has a S.E.  $\frac{3}{4}$  S. direction for one-third of a mile to Porth Gynfor, a small cove at the mouth of a ravine, similar to that of Llanlana. The gusts out of the ravine at Porth Gynfor, during a southerly gale, are said to be strong enough to upset any vessel not prepared for their violence. From Porth Gynfor the coast, bold and rocky, extends E. by S.  $\frac{1}{4}$  S. two-thirds of a mile to Porth Wen, a small cove bounded by sloping rocky ledges. Except for a limited extent within the western head, cliffs 40 feet high bound the bay, which is about one-quarter mile wide and deep. A smooth shingle beach in the opening within the western head affords facility for beaching in case of extremity; should such occur, it is necessary to pass on the starboard hand of an outlying arched rock.

**BULL BAY.**—The coast, still of the same bold, rocky character, holds S.E. by E.  $\frac{1}{4}$  E. one mile from the eastern point of Porth Wen to Melyn head, the north-western boundary of Bull bay. Immediately within the latter head is Porth Llechog, a boat cove and watering-place, but the rocks which form it, shelve off fully one cable, and are topped by a high and dangerous swell in easterly winds. From point to point of Bull bay is S.E.  $\frac{3}{4}$  E. one mile, the depth of the indentation is half a mile, and it is bounded by rocky cliffs. The shelter in it is good in winds from W.N.W., south about, to S.E.; the anchorage is in 5 or 6 fathoms over sand. The eddy tide stream in this bay attains a rate of only 2 knots, while the stream in the offing is running nearly 5 knots.

**Life-Boat.**—A life-boat is stationed in Bull bay.

**EAST MOUSE** is one-sixth of a mile outside the south-eastern point of Bull bay; it is 70 yards across east to west, and 30 yards from north to south; the highest part is 12 feet above high-water, and it is steep-to. The channel between it and the main is 7 fathoms deep, but in navigating it, vessels generally keep near the islet, in order to avoid some ledges which skirt the shore on the opposite side of the passage.

Point Lynus light kept in sight will clear the islet by one-quarter of a mile to the north-east, and it is altogether within the proper coasting track of vessels.

**AMLWCH**, at the head of the bay of the same name, is immediately to the south-eastward of Bull bay and the East Mouse. Amlwch bay is half a mile wide, but is very narrow towards its head, and off the western side is encumbered by a rock having 9 feet upon it. The position of this

rock is indicated by two beacons near Mona mill on the western shore, and by two other beacons on the southern shore, one cable to the eastward of the pier.

**Harbour.**—Amlwch harbour is formed by a well-built stone pier projecting from the eastern cliff, within which is a dock protected from the in-run of the sea by booms. This dock is capable of holding a number of vessels, and was constructed at considerable expense for the shipment of the copper ore obtained from Paris mountain, and other mines of the neighbourhood. The harbour has a hard and flat bottom, but vessels lie securely in it. At the pier-head there is a depth of 18 feet at high-water springs, and 13 feet at neaps, but it is dry at low-water springs.

**LIGHT.**—A light is shown from a small white lighthouse on the east pier-head at an elevation of 30 feet above high-water; the light is *white* and *fixed*, and being intended solely for vessels using the port it is only visible between the bearings S.W.  $\frac{1}{4}$  S. and W.  $\frac{1}{4}$  S.; it is not lit during strong westerly winds, when the harbour is closed by the booms, at such times, or when a *red* light is shown, no vessel should attempt to enter. A ball hoisted on a staff at Llam-y-carw point, which is about  $\frac{1}{4}$  mile to the eastward of the harbour's mouth, gives the like warning by day.

**CAUTION.**—Care must be observed not to mistake any of the fires of the smelting works for the pier light, and it must also be remembered that the latter, and the light on point Lynus are often obscured in southerly winds by the smoke from the furnaces.

**TIDES.**—It is high-water, full and change, at Amlwch, at 10h. 30m.; springs rise 18 feet, ? neaps 13 feet ?.

**Directions.**—Amlwch may be easily distinguished from seaward by Mona mill, a conspicuous object over the west side of the harbour, and also by the flame and smoke of its numerous furnaces. Pilots are always in attendance at tide-time to assist in warping vessels into the harbour. Point Lynus light becomes obscured when a vessel is half a mile from the harbour, and as the lead cannot be trusted as a guide, the pier light should be brought to bear about S.W. by W., in order to close it safely; leave the rock, indicated by the two west beacons, to the westward, and, as the approach is very contracted, and in off-shore winds the bay is very subject to variable gusts, an anchor should be ready for letting go, and warps pointed.

**Rockets.**—At the coast-guard station is a rocket apparatus, with belts and lines.

**Graving Dock.**—At the head of the harbour is a graving dock for the repair of vessels not exceeding 200 tons.

Amlwch is a creek of Beaumaris. Besides the export of copper there is a considerable manufacture of alkali, colour, and paint. A railway passing through the centre of the island joins the Holyhead and Chester line at Gaerwen station.

Population in 1881, 2,664.

**LYNUS BANK**, which appears to be increasing, is to the north-westward of point Lynus, its south-eastern end being half a mile from the point. The length of the bank is about half a mile in a direction parallel to the coast, and it is one-eighth of a mile broad; the least water upon it is 6 fathoms, and it is steep to, and generally marked by a tidal overfall. At its centre, the East Mouse is in line with the middle of porth Llechog bay, bearing N.W. by W.  $\frac{1}{8}$  W., and Llanelian church is open twice its apparent breadth to the westward of the beacon on Llanelian mountain, S. by W.

**LYNUS COVE** is on the west side of Lynus point; it is one-third of a mile deep, and is a secure anchorage in off-shore winds, the depths being 8 and 9 fathoms, over mud and sand: the tide-streams are not felt in the bay. No vessel should remain here with the wind in, for the bounding shores are steep and a sea is quickly sent home. Caught under such circumstances, the only chance of saving life would be by beaching under the shelter of the rocky spit at the head of the bay. To do this, keep in mid-channel between the end of the ledge and the east cliffs, and then luff round towards the limekiln on the west side of the head of the cove.

Good fresh water may be procured at the landing-place.

**POINT LYNUS**.—Point Lynus, S.E. by E.  $\frac{1}{8}$  E.,  $1\frac{1}{4}$  mile from the east point of Amlwch bay, is, from its character and advanced position, very conspicuous from the eastward and westward. On the north-east brow of Llanelian mountain, just within it, is a disused telegraph station.

**LIGHT**.—Lynus lighthouse, a white castellated building, 36 feet high, standing near the pitch of the point, was built by the Liverpool Dock Trustees to supersede one of an inferior order. The light, which was first exhibited in 1835, is 128 feet above high-water; it is an *intermittent (occulting) white* light which continues visible for *eight seconds*, and is then obscured for *two seconds*, and may be seen at a distance of 16 miles in clear weather. The light is masked inshore of the bearing S.E.  $\frac{1}{8}$  E. to lead clear to the north-east of the Middle Mouse by half a mile; and also inshore of a N. by W.  $\frac{3}{4}$  W. bearing to lead clear of Dulas rocks, and as a caution to vessels to tack when working in Red Wharf bay.

**Telegraph Station**.—There is a telegraph station in connection with Liverpool at the lighthouse. Vessels signalling to the station will be answered from the flagstaff on the east side of the lighthouse.

Point Lynus is a point of arrival and departure, and the following are some of the principal bearings and distances from the lighthouse:—

Middle Mouse	-	-	N.W. by W.,	5½ miles.
Menai lighthouse	-	-	S.E. by S.,	10 $\frac{9}{16}$ "
Great Orme head lighthouse	-	-	S.E. $\frac{1}{2}$ E.,	15½ "
Buoy at the tail of Constable bank	-	-	S.E. by E. $\frac{1}{2}$ E.,	21 "
N.W. light-ship off the Mersey	-	-	E. by S. $\frac{1}{2}$ S.	27 "
Chicken rock lighthouse, Calf of Man	-	-	N. $\frac{1}{2}$ W.,	42 "

Vessels working out of Red Wharf bay during strong south-west winds will, in passing from under the lee of point Lynus, find the wind head two or three points, the same as occurs in working to the eastward past Carmel head in strong south-east winds.

**Pilot Vessels.**—Some of the Liverpool pilot-vessels generally cruise in the neighbourhood of point Lynus; they are furnished with signals for communicating with the various coast telegraphs in connection with Liverpool.

**Tidal Streams.**—The stream turns at the time of high and low-water by the shore. At an offing of one mile the stream of spring tides runs at the rate of 5 miles per hour, and of neap tides at 3 miles per hour. The spring flood produces a strong race from the point for half a mile to the eastward.

**FRESHWATER BAY.**—The coast from point Lynus turns abruptly to the southward for half a mile to Freshwater bay, which affords anchorage, during westerly gales, in 9 or 10 fathoms. In a small creek in this bay, used by fishermen, landing can be effected when it would be impracticable at Lynus cove. Fresh water may also be procured in a ravine at the south end of the bay.

**PORTH HELYGON,** under the slope of Llanellian mountain, half a mile beyond Freshwater bay, also affords shelter in westerly gales, in 4 or 5 fathoms, over sand; the high-water boundary is of shingle, but the indenture is small, and the shelves which project from the shore render landing dangerous to boats. There is a limekiln abreast the middle of the bay, near to which fresh water may be procured.

**COAST.**—From the southern point of porth Helygon the coast trends for half a mile S. by W. to a copper mine near the high-water boundary; then it continues S.W.  $\frac{1}{2}$  W. to the entrance of Traeth Dulas, an inlet with a narrow entrance, but one mile in extent in a S.W. by W.  $\frac{1}{2}$  W. direction. The southern boundary of the entrance consists of a shingle beach and low flat sand-hills. Traeth Dulas has a somewhat rapid stream, it is available for flats and other small craft at spring tides, but the foreshores dry out to a considerable distance at low-water.



**DULAS ROCKS.**—The much dreaded Dulas rocks are S. by E.  $\frac{1}{4}$  E., 2 miles from point Lynus, and E. by N.  $\frac{1}{2}$  N., one mile from the entrance to Traeth Dulas. They extend four cables in a N. by E.  $\frac{1}{4}$  E. and S. by W.  $\frac{1}{4}$  W. direction, and towards the centre of the reef, a portion equal to nearly one-third of its extent is always uncovered, upon which a pointed tower with staff and vane, 31 feet above high-water, was erected by a neighbouring humane proprietor shortly after the loss of a Liverpool vessel upon the rocks. A detached patch one-eighth of a mile to the eastward of the reef, dries at low-water; with this exception it is comparatively bold to.

At night, point Lynus light kept in sight leads a short distance outside the reef; and the  $2\frac{1}{2}$  fathoms channel separating it from the main may be sailed through by bringing point Lynus lighthouse to appear just above Helygon point, bearing N.  $\frac{3}{4}$  W., but it should be used only by day, and by those well acquainted with it.

**Dulas Bay**, including the space contained between Dulas rocks and Moelfre islet, is only fit for a stopping-place for a tide in south-westerly winds.

**MOELFRE ISLET and ROAD.**—The small islet Moelfre, separated from Moelfre point by a narrow rocky channel, is S.  $\frac{3}{4}$  E., 2 miles from the tower on Dulas reef. The outer side of the islet is steep to, and may be neared to half a cable. The village of Moelfre, on the margin of the bay of the same name, which is immediately to the south-west of the islet, has a shingle bank in front of it. At this place good water and other supplies may be procured; quantities of fish are also caught by the resident fishermen, and sent to Beaumaris and neighbouring markets.

The anchorage in front, named Moelfre road, is often used by Liverpool and other vessels in westerly gales, in preference to incurring the risk of bearing up for the Mersey. The shelter in it is complete with the wind from N.N.W., west about, to S.S.W., and the depth is 3 or 4 fathoms, over a bottom of mud and sand. It has also the advantage of the near neighbourhood of Menai strait to afford shelter in case of extremity. The best anchorage is one-quarter of a mile out from Moelfre point, with Llanellian dismantled telegraph showing over it; here scarcely any tide stream is felt during either flood or ebb. Point Lynus light is eclipsed two-thirds of a mile outside Moelfre island and road.

**Life-Boat.**—Moelfre is a life-boat station.

**RED WHARF BAY.**—Traeth Bach is a well-marked bay or bight one-quarter of a mile wide, close to the southward of Moelfre road; it is dry at low-water, but vessels lie upon its clean sandy beach, and ship large quantities of limestone from the quarries near it.

Carreg Dwrban, or Castle point, the western boundary of Red Wharf bay, is S.  $\frac{1}{4}$  E.  $1\frac{1}{2}$  mile from Traeth Bach; it is crowned by a steep, abrupt, and regular mass of rock, not unlike the remains of a castle when seen from a distance. At the point, the coast turns abruptly to the south-westward for upwards of one mile to the head of the bay, and then, as a ridge of low-sandhills, sweeps gradually round to abreast Llandouna church. The greater portion of the bay is occupied by sand, which dries out fully a mile at low-water, but a large quantity of the excellent limestone of the neighbourhood is shipped from a jetty at porth Llongdy, two-thirds of a mile within Castle point. The depths in the approach to the bay are regular, over a bottom of mud and sand.

**CAUTION.**—Red Wharf bay is situated so much within the general line of coast that vessels using it cannot be too cautious in guarding against a change of wind from off-shore; when that occurs no time should be lost in seeking the shelter of Menai strait. Through the deep ravine also which extends nearly across Anglesea and has its outlet by Llwydiart mountain at the head of the bay, violent gusts proceed in westerly gales that are sufficient to dismast any vessel incautiously carrying much sail.

**COAST.**—The cliff of Carreg Onnen is to the eastward of Red Wharf bay, and has just within its brink a building like an old tower. The shore under Table hill is steep-to, and the anchorage abreast, named Table road, with a depth of 7 or 8 fathoms, may be used in off-shore winds.

From Carreg Onnen the coast trends irregularly S.E. by E.  $\frac{1}{4}$  E. for  $2\frac{1}{2}$  miles to Dinmor point, which is a limestone cliff steep-to, with several shipping-places that are used in off-shore winds.

**DINMOR BANK**, about one cable broad, lies one-third of a mile from the land between Dinmor and Trwyn Du points, and extends in patches of 11 feet for two-thirds of a mile N.N.W.  $\frac{1}{4}$  W. from Menai lighthouse. Since the former Admiralty survey in 1837, the bank appears to have extended  $2\frac{1}{2}$  cables in that direction.

**Buoy.**—A red can buoy lies in 30 feet, N.N.W.  $\frac{3}{4}$  W., half a mile from Menai lighthouse, and with Penmaenmawr seen half-way between Menai lighthouse and Trwyn Du point; in this position the buoy is of little use to navigation, as it is placed near the middle of the bank, with 11 feet  $1\frac{1}{2}$  cable from it to the N.N.W. To clear Dinmor bank on the north, have the inner fall of Great Orme head open northward of Puffin island, bearing E.S.E.; and to clear it on the east, keep Penmaenmawr midway between Puffin island beacon and Menai lighthouse, but when within  $2\frac{1}{2}$  cables of the lighthouse the peak should be brought nearly over the beacon.

**TEN FEET BANK** is outside Dinmor bank, and about three-quarters of a mile to the northward of Puffin island, it has 9 feet over its shoalest part, with the north-east point of Puffin island, bearing S.E.  $\frac{1}{4}$  E.,

distant  $8\frac{1}{2}$  cables; and Menai lighthouse, in line with the east extreme of Trwyn Du point, S. by W.  $\frac{1}{2}$  W., 8 cables.

**Buoy.**—From this shoal spot the bank extends E.S.E. 4 cables, with a depth of 14 to 24 feet; and with 20 to 24 feet N. W. by W.  $\frac{1}{2}$  W.,  $2\frac{1}{2}$  cables, where, in the latter depth, is placed a can buoy *striped horizontally black and white*; with the south-west point of Puffin island, bearing S.S.E., distant 9 cables, Penmaenmawr being just open of it; Dinmor point, S.W.  $\frac{1}{2}$  S.,  $7\frac{1}{2}$  cables; and Menai lighthouse, South, 9 cables.

The sea breaks heavily over this bank with north-west winds and ebb tide, and near low-water of springs there is a tide-rip over the ridge of broken ground of 5 to 6 fathoms, which connects it with Dinmor bank. The water is deeper on the eastern side than to seaward of this ridge.

Penmaenmawr, open eastward of Puffin island, bearing S. by E., clears Ten Feet bank to the eastward; and Penmaenmawr, open west of Puffin island, S. by E.  $\frac{3}{4}$  E., clears it to the westward; Carreg Onnen bearing west of W.  $\frac{3}{4}$  N. clears it to the northward. To pass between Ten Feet and Dinmor banks, have the inner fall of Great Orme head open northward of Puffin island, bearing E.S.E.

Dinmor and Ten Feet banks will be again noticed in the general sailing directions for the entrance to Menai strait, page 109.

#### MENAI STRAIT.

##### NORTH-EAST ENTRANCE.\*

**BEAUMARIS BAY**, about 5 miles wide by 4 miles deep, embraces the whole of the space within the line of Puffin island and Great Orme head, which bear from each other E.  $\frac{3}{4}$  S. and W.  $\frac{3}{4}$  N., and no stranger should tarry within that line except under favourable circumstances. With a strong northerly wind and flood tide a vessel would have little chance of beating out of it, and, instead of allowing her in such a case to be forced into the bay, the seaman should be prompt in seeking the shelter of Menai strait. The bay outside the line of the sands is free of hidden dangers, and the bottom throughout is regular and fair holding-ground.

The north-east entrance to Menai strait lies between Anglesea island and the sands on the western side of Beaumaris bay.

**PUFFIN ISLAND**, or Priestholm, directly off Trwyn Du, the north-western point of the strait, divides the entrance into two channels. The island, which is rather more than half a mile long in an E.N.E. and W.S.W. direction, and one-eighth of a mile broad, has near its centre the conspicuous tower of a ruined chapel, and at its north-eastern extremity a telegraph station and attached buildings. The ledge, or rocky base of the island, does not project off more than half a cable, except at its south-western end, from whence a mass of rock extends for one-quarter of a mile,

\* See Admiralty chart, Menai strait, No. 1,464; scale,  $m = 2.95$  inches.

which no doubt represents the wastage of the island by the sea. The western elbow of these ledges, which is covered at half-flood, or 13 feet rise, is marked by a large conical stone beacon, *striped horizontally black and white*, with a staff and globe on its summit. The landing-place is just within the south-west extremity of the island, and may generally be used except in strong south-easterly winds.

**Causeway.**—A long narrow spit, known as the Causeway, extends S. by E. one-quarter of a mile from the beacon; it is composed of large stones, dries about 2 feet in height at low-water, with a depth of from one to two fathoms close to it, and appears to be an artificial work. According to tradition it was formerly the landing-place for persons from Carnarvonshire attending the religious services of the chapel on the island.

**Buoy.**—The southern extremity of the Causeway is marked by a *red conical buoy with staff and globe*.

A patch with 4 feet over it lies mid-channel between this buoy and Dutchman bank, which forms the south-eastern side of this entrance to the strait of Menai.

**TRWYN DU, or BLACK POINT**, the north-western boundary of the entrance to the strait, is S.E.  $\frac{1}{4}$  E. half a mile from Dinmor point; the neat stone residences of the light-keepers are prominent objects upon it.

**MENAI LIGHT.**—Rocky ledges extend N.E. by N. more than one cable from Trwyn Du; their extremity is marked by a circular stone lighthouse, 96 feet high, with a massive solid base. The *fixed red* light shown from it is 61 feet above high-water, and is visible 12 miles off in clear weather, except between the bearings W.  $\frac{1}{4}$  S. and W. by S.  $\frac{1}{4}$  S., when it is obscured by Puffin island.

**Fog Signal.**—A large bell is sounded in thick or foggy weather *three times* in quick succession *every fifteen seconds*.

No vessel should pass the lighthouse nearer than 50 yards, as sunken ledges extend some distance from the base of the tower.

The north-west passage into Menai strait, between the lighthouse and Puffin island beacon, is little more than one cable wide.

**Penmon Point.**—From Trwyn Du, the shore extends S.W. by W.  $\frac{1}{4}$  W. for one-third of a mile to Penmon point, close round which, in Penmon bay, is a limestone quarry and shipping-place. The bay, which dries throughout, is one-quarter of a mile deep and three-quarters of a mile across to Penrhyn point; off the latter, foul ground, named the Platters, dries out for one-third mile. The width of the channel here is less than half a mile.

**Trecastell Point.**—Above Penrhyn point another bight occurs to Trecastell point, which bears from the former S.W. by W., one mile. The whole bay dries from the Platters to two-thirds of a cable outside Trecastell point, the flat being composed of stones and rocks, many of which stand up 5 or 6 feet above the general level, and are therefore very dangerous. The channel abreast is contracted at low-water to a breadth of a quarter of a mile.

From Trecastell point to the point of Beaumaris green is S.W.  $\frac{1}{4}$  S.,  $1\frac{1}{2}$  mile, the intervening bight being named Friar bay. Friar house, a large mansion, stands among trees near the shore abreast the middle of it. From this house the high-water boundary is a cliff, which, at Battery hill, near Beaumaris, attains the elevation of 65 feet. On the point of Beaumaris green, the customs watch-house stands conspicuously forward, and is useful as a sea-mark. The foreshore dries to about one cable outside the point, and the channel becomes tortuous and little more than one cable wide.

**BEAUMARIS.**—The town of Beaumaris, situated immediately within the point of the green, occupies about half a mile of the shore frontage, and the portion facing the water consists of handsome mansions and terraces of stone houses. Beaumaris castle, an ivy-clad ruin, is at the east end of the town. The square tower of the church is a plain object. Baron hill, a baronial residence in the midst of wood, is prominent a little above the town, and being backed by hills with a well-marked outline, completes a picture of great beauty. A landing-pier for the steam-packets extends 200 yards from the middle of the town face to low-water mark.

**LIGHT.**—On the head of the pier, a *fixed red* light is shown throughout the night.

Beaumaris has no manufactures and but little trade. It is the chief port of the custom-house for Bangor and neighbouring creeks. The returns for the former in 1882 were :—vessels belonging to the port, 182, of 10,092 tons; coasters, inwards, 5,403=1,118,434 tons; outwards, 5,317=1,107,182 tons; foreign, inwards, 7=2,988 tons; outwards, 8=2,722 tons. The coasting trade outwards, which consists almost entirely of slates for which no clearances are required, is about twice the number of the vessels entered inwards. Population in 1881, 2,241.

**The COAST** from Beaumaris forms another bay to Gallows point, which is low and flat, like that off Beaumaris green, and W.S.W., three-quarters of a mile from the latter. The intervening low-water shore, consisting of mud and sand, is well adapted for laying vessels upon. A *red* can buoy a little above Gallows point, and the last one on this side the channel, marks the fore-shore and also the narrowest part of the strait,

which is less than one cable wide. Immediately above Gallows point occurs the confluence of the tide streams arriving from the opposite entrances of Menai strait.

From Gallows point the shore trends westerly for  $1\frac{1}{2}$  mile to Garth point and ferry. This point is steep-to, and is half a mile from Bangor point, or Trwyn-y-Garth, the opposite point of the ferry. At low-water the channel is only two cables in breadth.

A description of the channel above Garth point would serve no practical purpose, as a vessel passing along it would be in charge of a pilot; it will be sufficient to observe that for 2 miles farther, to the suspension bridge, it is bordered by rich woods and numerous villas, and by a stony foreshore averaging one cable in width. The continuity of the shore for the last mile, however, is broken by four small islets based on a ledge of rock conforming to the general direction of the strait. A little above the south-westernmost islet is a steam-packet landing-quay and stage, and a short distance farther is the old ferry slip in connexion with a landing-place under Bangor ferry-house on the opposite side. It is still used as a convenient passage, the distance across being about one-fifth of a mile. A danger, named the Half-tide rock, lying out 30 yards from the shore, with a depth of 2 fathoms within it, is nearly midway between the old ferry and the suspension bridge.

**BRIDGES.**—The suspension bridge, and the Britannia tubular bridge, one mile above it, are structures too well known to need much description here. The suspension bridge is 916 feet in total length, with a central navigable span of 560 feet, and the roadway is 100 feet above high-water; the Britannia bridge has a navigable channel on either side of the central tower of 370 feet in width, and the roadway is 101 feet above high-water. The former was opened in 1826, the latter in 1850.

There is a ferry at port Dinorwic, where the strait becomes wider.

The length of the island of Anglesea from east to west is  $19\frac{1}{2}$  miles, and its width from north to south is 18 miles. Pengarn Mount, within Carmel head, has an elevation of 550 feet; and mount Paris, at the north-east part of the island, and from which much copper has been obtained, is 484 feet above high-water.

**PENMAENMAWR POINT**, on the south-eastern side of Menai strait, lies S. by E.  $\frac{1}{4}$  E. about 4 miles from Puffin island. This bold rocky point is the foot of the remarkable mountain of the same name, the summit of which is 1,540 feet above high-water. The mountain stands boldly forward from the range on either side of it, its dark colour, being varied by the working of extensive quarries in its face, and it forms a noble and striking object, even at a considerable distance seaward.

From Penmaenmawr, the shore, as a low foot to a mountainous back-ground, extends west 5 miles to the river Ogwen, and to the abruptly projecting point of Penrhyn ; within the latter the ground rises into a prominent hill, on which is the well-wooded and beautiful park of Penrhyn, with its castle, the picturesque towers of which are *seen from every part* of the strait. From the bath-house on *the extremity* of Penrhyn point the shore to Garth ferry forms an indenture one mile wide and a quarter of a mile deep ; in which is Penrhyn quay and basin, a quarter of a mile long, from whence the slates, quarried 6 miles inland, are shipped in immense quantities.

**PORT PENRHYN**, east of the city of Bangor, is a dry harbour, having at high-water spring tides from 13 to 11 feet over it. At its east side are the wharves and basin above-mentioned, with 17 to 14 feet at high-water spring tides, and 11 to 8 feet at neaps.

**LIGHTS.**—On the west pier-head of the basin is a *red* light, and on the east pier-head a *green* one ; besides these lights there is a line of *white* lights along the wharves which can be seen by vessels navigating the strait.

From Bangor point an iron ferry-pier extends to beyond the outer margin of the flat, it has 14 feet over it at high-water springs, and a *black* buoy marks its outer end.

**BANGOR.**—The city of Bangor stands low in the valley within Bangor point. Upon the summit of the northern ridge of the valley is a distinct mound named Camp hill, which is an important sea-mark.

The chief trade of Bangor is in slates, which are exported in vast quantities, employing at the chief place of quarrying about 6,000 men ; ship-building is also carried on to some extent.

**Patent Slip.**—There is a patent slip on which vessels of 300 tons can be taken up.

Bangor is a coast-guard station. The population in 1881 was 8,240.

The railway from Chester to Holyhead skirts the shore below Penmaenmawr, and crosses the strait by the Britannia bridge, while a branch line is continued on to Carnarvon.

At Bangor point the shore extends westerly and then nearly direct to the suspension bridge, and its stony foreshore becomes gradually narrowed, until within three-quarters of a mile of the bridge, when it projects but little from the high-water boundary.

**BANGOR FLATS.**—The extensive sands in front of Penrhyn, known as Bangor flats, dry out nearly one mile abreast the bath-house, to a quarter of mile abreast the ferry ; they are partly occupied by salmon weirs and by a large bank of ballast discharged by the vessels which load

at port Penrhyn. The outer spit of the flat, a little below Bangor ferry, is marked by a *black* nun buoy.

**LAVAN SANDS, DUTCHMAN BANK.**—The north-east entrance of Menai strait between Trwyn Du and Penmaenmawr points is 4 miles wide, nearly the whole of which space up to abreast Penrhyn point, is occupied at low-water by Lavan sands, which, taken collectively, assume the form of an irregular triangle. Several passages, as the Mid-lake and Penmaen swashes, traverse the outer portion, and separate the mass into distinct divisions, the outermost of all being named Irishman spit, and that between the swashes above-named, Dutchman bank. There are several minor runs across the body of Lavan sands, which at low-water are separated from Bangor flats by the winding channel of the river Ogwen.

The whole of Lavan and Bangor flats are composed of fine sand, but the foreshores of the strait from Penmon point to the suspension bridge on the one side, and from Bangor point to the bridge on the other, consist of large and small stones and rocky patches.

**Buoys.**—The outer extremity of Dutch spit is marked by the Dutchman buoy, a *black* nun, in 15 feet; from this buoy the ruined semaphore at the north-east end of Puffin island bears N.W. by W., distant 3 cables; and Menai lighthouse is in line with the south-west end of Puffin island, bearing West.

Off the north entrance of Penmaen swash is a *black* nun buoy, in 6 feet; from it Menai lighthouse bears N. by E.  $\frac{1}{2}$  E., and Penrhyn point is N.W. by W.  $\frac{3}{4}$  W.,  $7\frac{1}{2}$  cables.

A *red* can buoy lies in 16 feet, in nearly mid-channel, W. by N., 3 cables from Penmaen swash buoy.

A *green* wreck buoy lies in 18 feet, mid-channel, S.E.  $\frac{1}{2}$  S., 4 cables from Penrhyn point.

A *black* buoy with staff and ball is in 13 feet, mid-channel,  $1\frac{1}{2}$  cable off Carreg Duon, a projecting point of large boulders near the centre of Tre Castell bay.

A *black* nun buoy is in 18 feet on the south-east side of the channel, S. by E.  $\frac{1}{2}$  E., 3 cables from Tre Castell point.

A *black* nun buoy is in 18 feet on the south-east side of the channel, E. by S., 4 cables from Battery hill, Beaumaris.

A *red* can buoy is in 16 feet on the north-west side of the channel, E. by N.  $\frac{1}{2}$  N., 3 cables from Battery hill, Beaumaris.

**FRIAR BANK.**—Between the last two buoys is Friar bank, which extends up and down the channel for 3 cables, with from 7 to 12 feet over it; the shoalest water, 7 feet, is S.E. by E.  $\frac{1}{2}$  E.,  $2\frac{1}{2}$  cables from Battery hill;



between it and the bank off Battery hill is 15 feet, and between it and Lavan sands 21 and 22 feet.

**Buoys.**—A *red* can buoy lies in 23 feet off the edge of the bank fronting Watch-house point.

A *black* nun buoy lies in 18 feet off the east end of a spit which forms the south side of the channel opposite Beaumaris pier.

A *black* nun buoy lies in 6 feet on the south side of the channel,  $3\frac{1}{2}$  cables W. by S. from the last-mentioned buoy.

A *red* can buoy lies in 12 feet off the elbow of the Oyster bed which extends from Gallows point, and S. by W. 2 cables from the Drill battery on the point.

A *black* nun buoy lies in 20 feet on the south side of the channel, N. by E.  $\frac{1}{4}$  E.,  $3\frac{1}{2}$  cables from the Coast-guard house on Garth point.

A small *black* buoy lies off the end of the iron ferry-pier, in 2 feet, to mark its position when covered.

From Menai lighthouse to Bangor, *black* buoys mark the edge of Dutchman bank, Lavan sands, and Bangor flat, on the south-east and south sides of the channel; but the *red* buoys between Menai lighthouse and Battery hill, lie nearly in mid-channel, and the north-west side of the channel, where they should be, is left unmarked: from Battery hill towards Bangor, *black* buoys mark the south side of the channel, and *red* buoys the north side.

**Pilots.**—Menai pilots reside at Penmon, and are always on the watch, but having only small boats they are often unable to board vessels when their services are most in request, and do not get on board until the vessel is within the entrance and comparatively out of danger.

**Life-Boat.**—The pilots form the crew of the life-boat, which is stationed just within Trwyn Du.

**Directions to Outer Road.**—The two passages into Menai strait which are separated by Puffin island have each their advantages under different circumstances of wind and weather; thus the north-west passage, or “the sound” as it is sometimes called, may, from its direction, depth, and well-marked character, be taken in the heaviest gale when refuge is required, provided dependence can be placed on the steerage of the vessel; while in south-easterly winds the north-east passage is generally used, as the wind is then foul in the sound, which is too narrow for a vessel to beat through.

It is necessary to remember that the flood stream begins to set through the north-west passage when it is low-water by the shore, which is not the case at the north-east passage until  $1\frac{1}{2}$  hour flood.

**North-west Passage.**—Ten Feet and Dinmor banks are situated in the approach to this entrance, which is only one-eighth of a mile wide between the main and island ledges, with depths of 8 to 3 fathoms over a rocky bottom to a singular depth of  $14\frac{1}{2}$  fathoms, named the pool, abreast the middle of the Causeway, when the depth again decreases to 5 and 4 fathoms in the outer road, which is about one-third of a mile long and two cables wide between the Causeway, Dutchman bank and spit, and the Platters.

The general leading mark to the north-west passage between Ten Feet and Dinmor banks, until well up to Puffin island beacon, is Penmaenmawr, in line with Puffin island beacon, bearing S.S.E.

Penmaenmawr, open eastward of Puffin island, bearing S. by E., clears Ten Feet bank to the eastward; when, if bound through the north-east passage, give the island a berth of one cable to avoid its outlying rocks.

The inner fall of Great Orme head, open northward of Puffin island, bearing E.S.E., leads between Ten Feet bank to the northward, and Dinmor bank and Puffin island to the southward.

Ten Feet bank will be cleared to the northward by keeping Carreg Onnen bearing west of W.  $\frac{1}{4}$  N.

To pass between Dinmor bank and the shore, keep Menai lighthouse in line with Puffin island beacon, until Trwyn Du bears S. by W., then haul to the northward and pass 50 yards outside the lighthouse.

Having arrived within half a cable of the beacon by any of the foregoing tracks, Penrhyn castle will be observed well open of Trwyn Du; then steer about S.S.W.  $\frac{1}{4}$  W. to the outer road, and, if it be early tide, anchor in  $3\frac{1}{2}$  or 4 fathoms, sand, with Penmon church bearing N.W. by W.  $\frac{1}{4}$  W.; and Camp hill, near Bangor, open a little to the north-westward of Beaumaris watch-house, S.W. by W.  $\frac{1}{4}$  W. In this roadstead the weight of the sea in north-easterly gales is so broken by the outer banks that there is no difficulty in riding in it to a vessel well found in ground tackle.

**North-east passage.**—The north-east passage, which should not be sailed by a stranger until half-flood, is divided into two very narrow channels by two nine-feet banks or ridges lying between Puffin island and Dutch spit. Above these banks the channel for one-third of a mile is about 2 cables wide, when it becomes gradually contracted to half that breadth by a spit projecting from the Causeway with 4 feet upon it, which, not being marked, is a dangerous obstruction to this portion of the navigation.

The channel to the south-eastward of the nine-feet banks is the most direct, and the one usually taken. The leading mark through is, Camp hill, near Bangor, in line with Beaumaris watch-house, bearing S.W. by

W.  $\frac{1}{4}$  W., but if this mark is being brought on from the eastward, then, in the absence of the buoy, and to clear Dutch spit, keep the old tower on the outline of the land, near Beaumaris, in line with Penmon point, bearing W. by S.  $\frac{1}{4}$  S. Camp hill must be kept over the watch-house until Menai lighthouse appears in line with Puffin island beacon; then steer S.W.  $\frac{1}{4}$  S., pass to the south-east of the *red* beacon buoy at the end of the Causeway and when Penmon church appears open of Penmon point, bearing N.W. by W.  $\frac{1}{4}$  W., proceed with it so, and anchor in the outer road as before directed.

**Directions above the Outer Road.**—Upon weighing from the outer road proceed with Camp hill open a little to the south-eastward of Beaumaris watch-house, bearing S.W. by W.  $\frac{1}{4}$  W., passing between the *black* buoy on Dutchman bank and the *red* buoy off the Platters until the end of Friar lane (close to the westward of Friar house) appears in line with Baron hill, W. by S. southerly; keep this mark on until Penmon church shows in line with the outer end of Treicastell weir, N.E.  $\frac{1}{4}$  N.; this latter mark will lead up to Friar road, a little below which anchorage may be taken up if necessary near the Friar buoy, with the old tower above Baron hill nearly in line with Friar house, in  $3\frac{1}{2}$  or 4 fathoms, mud and sand.

Vessels drawing about 8 or 9 feet may work up to Friar road at low-water, but care must be observed while standing towards the Anglesea shore, when above Carreg Duon, to have the west end of Puffin island open of Penmon point, and to tack off the Lavan side by the lead.

Friar bank divides the channel above Friar road into two passages, the south-eastern of which is the deeper, having from  $2\frac{1}{2}$  to  $3\frac{1}{2}$  fathoms in it at low-water. From Friar road keep Penmon church open of the end of Treicastell weir, bearing N.E.  $\frac{1}{4}$  N., passing between the *black* buoy on Lavan sands and the *red* buoy on Friar spit until Baron hill appears in line with the watch-house, when the vessel will be about one cable outside the *red* buoy marking the foreshore from the point of the green. In this position is good anchorage in 5 or 6 fathoms, and it is an excellent starting-place for wind-bound vessels, but the stream is strong and it is subject to eddies. If intending to anchor opposite Beaumaris, then steer in mid-channel towards the white house within Gallows point, passing to the northward of the *black* buoy lying at the end of a spit from the Lavan, and anchor in the road rather on the town side of the channel in 4 or 5 fathoms, clay, with Baron hill in line with the church. There is always some swell in this road with fresh northerly winds.

To proceed up to Bangor pool, steer from Beaumaris road about S.W. by W.  $\frac{1}{4}$  W. towards Camp hill, taking care to leave the small *red* can buoy, marking the elbow of the oyster bed off Gallows point, half a cable on the

starboard hand; having rounded it, steer about W.  $\frac{1}{4}$  N. for Garth ferry-house, passing to the northward of an eight-feet ridge lying rather over on the south side of the channel, until abreast the *black* nun buoy at the end of the spit from Bangor flats; then give Garth ferry point a berth of one cable, and anchor in the pool, (which is immediately above it,) when the highest tower of Penrhyn castle appears in line with Bangor point, in 5 or 6 fathoms, mud and sand. This is a convenient stopping-place for vessels not adapted for taking the ground, and it is usual for large ships loading slates to anchor in it and receive their cargoes from flats, as Penrhyn quay will only accommodate vessels of 11 feet draft alongside it at high-water neap tides.

Reference has already been made at page 79 to the confined and critical navigation of Swellies reach between the suspension and tubular bridges, and as no vessel could use the passage without a pilot, any directions for its navigation are unnecessary. Three pilots are required in passing through the strait, namely, for Beaumaris, the Swellies, and Carnarvon.

#### MENAI STRAIT, TIDES.

	h.	m.		ft.	in.		ft.	in.
Llanddwyn island, H. W., F & C.	8	57	Spring rise	14	4	Neap	10	6
Belan point - - -	-	9 13	„	14	4	„	10	6
Carnarvon wharves - -	-	9 27	„	15	8	„	12	0
Dinorwic wharves - -	-	9 28	„	18	0	„	13	6
Pwllfanog - - -	-	9 33	„	19	0	„	14	3
Menai steamer's pier -	-	10 24	„	22	8	„	16	0
Beaumaris - - -	-	10 28	„	22	6	„	15	6
Menai lighthouse - -	-	10 18	„	22	9	„	16	6

Two tidal waves enter Menai strait, the one from the south over Carnarvon bar occupies 36 minutes in its passage to the Britannia bridge, and has increased the range to 19 feet; the wave entering from the north at Menai lighthouse occupies 11 minutes in its passage to Menai bridge with the same range as at Menai lighthouse.

It is slack water between Carnarvon bar and Menai bridge at about the times of high and low-water at Llanddwyn, the stream running to the south-west for  $6\frac{1}{2}$  hours while the water is falling, and to the north-east for  $5\frac{1}{2}$  hours while it is rising at that place, for the later and greater tide entering the north-east end of the strait, during the last-quarter of its flood, follows the ebbing south-west wave, and at its own last-quarter ebb allows the south-west flood to penetrate to as far as Gallows point.

**The Bridges.**—From observations made at Menai, north-east of the suspension bridge, and at Pwllfanog, west of the Britannia bridge, distant

from each other  $1\frac{1}{4}$  mile, it appears that the establishment at Menai is 50 minutes later than at Pwllfanog, and the range of the tide wave at Menai 3 ft. 8 in. greater at springs, and 1 ft. 9 in. at neaps than at Pwllfanog. From this difference of time and height of wave it follows, that for the last 50 minutes of the flood at Menai, the tide is rising there whilst it is falling at Pwllfanog, and at high-water at the former place the water there is 4 feet higher than at Pwllfanog, and the stream is running to the south-west at its greatest strength, 7 to 8 knots on springs, and 5 knots at neaps, through the rocky channel of the Swellies between Menai and Britannia bridges.

At Menai, the water is falling for the last 50 minutes ebb whilst it is rising at Pwllfanog, so that at the time of Menai low-water the water there is  $4\frac{1}{4}$  feet lower than at Pwllfanog, and the stream is running to the north-east at its greatest strength, 7 to 8 knots on springs, and 5 knots at neaps, and penetrates to as far as Gallows point.

Throughout the whole distance between Menai bridge and Menai lighthouse, the stream of the last-quarter ebb runs to the north-east, and the last-quarter flood to the south-west, during the rest of the tide there are two streams meeting and parting off Gallows point; they run towards that point during the first three-quarters of the flood, and from that point during the first three-quarters of the ebb.

The first of the flood stream sets directly to the eastward, past the north-west passage or sound, at the distance of a quarter of a mile, when it is low-water by the shore, and in light winds vessels should keep close by the western shore towards the lighthouse, and if necessary drop an anchor to avoid being drifted past.

**At Menai Lighthouse.**—The stream sets into the strait for  $4\frac{1}{4}$  hours, from a quarter of an hour after low-water to an hour before high-water, and out for  $7\frac{1}{4}$  hours, from an hour before high-water to a quarter of an hour after low-water.

**At Beaumaris.**—The stream runs south-west for  $5\frac{1}{4}$  hours from 2 hours flood to 2 hours ebb, and in the contrary direction for  $6\frac{1}{4}$  hours from 2 hours ebb to 2 hours flood, velocity 5 knots per hour at springs,  $2\frac{1}{2}$  knots at neaps.

The stream runs to the south-west, between Menai and Pwllfanog for  $6\frac{1}{4}$  hours, from an hour before high-water to  $1\frac{1}{4}$  hour before low-water at Menai, and to the north-east for  $5\frac{1}{4}$  hours, from  $1\frac{1}{4}$  hour before low-water to an hour before high-water at Menai. There is but little slack water between the bridges, about a quarter of an hour at springs, and half an hour at neaps; the stream, after turning, quickly gains its strength of 7 to 8 knots at springs, and 5 knots at neaps.

**At Pwllfanog** the tide runs to the south-west for  $6\frac{1}{2}$  hours, from half an hour before high-water to an hour before low-water, and to the north-east for  $5\frac{3}{4}$  hours, from an hour before low-water to half an hour before high-water. Velocity, 5 knots on springs,  $3\frac{1}{2}$  knots at neaps.

**At Dinorwic** the stream turns at high and low-water by the shore, the ebb running to the south-west for  $6\frac{1}{2}$  hours, and the flood to the north-east for  $5\frac{3}{4}$  hours. Velocity,  $3\frac{1}{2}$  knots at springs,  $2\frac{1}{2}$  knots at neaps.

**At Carnarvon Bar**, the stream turns with high and low-water by the shore, the ebb running to the south-west for  $6\frac{1}{2}$  hours, and the flood to the north-east for  $5\frac{3}{4}$  hours. The main strength of the tide is in the direction of the deep water channel to the bar, the ebb outside Belan having a tendency to set over the southern banks. Outside the bar the flood comes from the south-west and ebb from the north-west. From Carnarvon, the rate is 3 knots at springs, and  $1\frac{1}{2}$  knot at neaps to as far as the narrow channel between Aber-menai and Belan points, where it increases to 5 knots at springs, and  $2\frac{1}{2}$  knots at neaps. From Belan to the bar the rate decreases again to  $2\frac{1}{2}$  knots at springs, and  $1\frac{1}{2}$  knot at neaps. Outside the bar the rate is  $1\frac{1}{2}$  knot at springs, and  $\frac{3}{4}$  of a knot at neaps.

**COAST.**—From Penmaenmawr point the shore of Beaumaris bay sweeps to the eastward for 3 miles to Penmaenbach point, which, though not so bold and majestic, somewhat resembles the former point. Half a mile south-eastward of the latter is a place for shipping the hard paving stones obtained from the neighbouring hill.

From Penmaenbach point to Mussel hill, the point of Conway marsh, and the western boundary of the entrance to the river Conway, is E.  $\frac{1}{2}$  S.,  $1\frac{1}{4}$  mile, the intervening shore forming a rather deep indenture. Mussel hill is of a dark colour and somewhat singular appearance, being an artificial mound, consisting of the refuse of mussel shells collected for the purpose of obtaining pearls. The procuring of this shell-fish, which is very abundant on the adjacent sands, provided a livelihood for many of the poor of the neighbourhood; it has, however, of late years very much fallen off.

**Diganwy Point** at the opposite side of the entrance to the Conway, S.E. by E. one-third of a mile from Mussel hill, is very low and fronted by a shingle beach 70 yards broad; then succeeds the marshy isthmus Morfa Rhianedd, which is in one part only half a mile over and about 18 feet above high-water, giving to Great Orme head the appearance of an island when seen at a distance.

**RIVER CONWAY OR CONWY**, has its source in the small lake Llyn Conwy in the mountainous district where the counties of

Merioneth, Denbigh, and Carnarvon meet, and forms the boundary of the two latter. Its course for the first  $7\frac{1}{2}$  miles is about north-east for Pentre Veolas; then, with a short westerly bend, on to Bettys-y-coed 6 miles, near to which it is joined from the south-west by the rivers Machno, Lledr, and Llugwy. From thence it flows nearly due north  $3\frac{1}{2}$  miles to Llanryst, passing under a beautiful bridge constructed by Inigo Jones, and on to Conway 12 miles; the total length of the river being about  $28\frac{3}{4}$  miles.

**CONWAY**, or Aberconway, is upon the left bank of the river Conway rather more than one mile above Mussel hill. Abreast Diganwy point, the high-water shores of the outlet of the river are not more than  $1\frac{1}{2}$  cable apart, but they then recede, giving an irregular width of nearly half-a-mile up to the suspension bridge. The town presents the most picturesque appearance, for it is still enclosed by its old and dilapidated walls and towers, and its massive castle stands at the south end upon a rock, the chains of the suspension bridge passing through its walls; a connection of ancient and modern structures affording an interesting contrast. An excellent quay lines the whole of the river face of the town, which vessels of 12 feet draught may reach at spring tides, but they lie on the ground at low-water.

The Conway near the castle is, like Menai strait, and for similar purposes, crossed by two bridges, suspension and tubular, the latter running close southward and parallel to the first and earlier structure. The roadway of the suspension bridge is 110 yards long to a rock, which was formerly an islet, but is now connected by a causeway 800 yards in length with the eastern bank. Previous to the execution of this work accidents in using the old ferry were of frequent occurrence from the rapid tides and dangerous sea to which the Conway is subject. The roadway of the bridge has an elevation of 18 feet above high-water, which admits of the passage of small craft under it towards low-water. Midway across, under the bridge, is a pool of 7 fathoms, and a depth of 6 to 4 fathoms continues for one-sixth of a mile below it; the water then shoals to one-quarter of a fathom. There is a depth of 4 to 3 fathoms for the same distance above the bridge, when the channel at low-water becomes too shallow for the passage of boats.

**CONWAY SANDS AND CHANNELS.**—Conway sands fill up the entire space within a line drawn from Penmaenmawr point to the middle of the Great Orme under the mine of Gogarth.

The river Conway below the town has worked several channels or swashways through this extensive mass, which are subject to constant change. The outlet and bar of the river are about  $1\frac{1}{4}$  mile N. by E. from Penmaenbach point; there is also a more direct channel from Diganwy

point towards the western part of Orme head. The outer or fairway buoy, a can, painted with *red* and *white horizontal stripes*, lies in about  $2\frac{1}{2}$  fathoms, at the entrance of the South deep, and has Penmaenbach point bearing S. by W.  $1\frac{1}{4}$  mile. The mid-channel of the river runs from thence in a South direction, passing Bwrlingan rock, off which is a *red* can buoy, which is succeeded by No. 1 buoy, a can with *red* and *white vertical stripes*; a *red* nun buoy, No. 2, in the bend, where the channel turns easterly; then Rings buoy, a cone with *red* and *white horizontal stripes*; and afterwards by two *red* buoys, a nun and a can, numbered 3 and 4. The depth on the bar varies, and the channel is very narrow and affords only water for a boat after 4 hours' ebb. The outer or No. 1 buoy of the North deep, which is painted with *black* and *white horizontal stripes*, is in about the same depth as the fairway buoy, and bears about S. by W.  $\frac{1}{4}$  W., one mile, from the clifly pitch of Orme head, and N.E.  $\frac{1}{4}$  E. three-quarters of a mile from the fairway buoy; thence the channel takes a bend eastward for 4 cables to No. 2 buoy, *striped vertically black* and *white*, when it runs nearly straight for Diganwy, and is marked by two more buoys, Nos. 3 and 4, also *striped vertically black* and *white*. The junction of the two deeps is, as formerly, at the north-east part of the Mussel bank, which is marked by a perch.

**Pilots.**—There are no licensed pilots for the Conway; men acquainted with the navigation may, however, at times be obtained, but only in moderate weather as their boats are small. The buoyage is under the direction of the Trinity House, London, whose agent resides at Conway.

**Tidal Streams.**—The flood stream runs into the Conway for  $4\frac{1}{2}$  hours, turning when it is high-water by the shore. The ebb stream which runs down for  $7\frac{1}{2}$  hours has a velocity of 5 knots at springs and 3 knots at neaps.

**Directions.**—The bar should in no case be crossed before half-flood, or the swashways across the sands be used before the last-quarter flood, and then only by persons well acquainted with them.

Having neared the bar, leave the buoy on it on the port hand, and steer South,  $\frac{3}{4}$  of a mile, to No. 2 *red* buoy; leave this buoy on the starboard hand, and continue the course eastward past the buoys on the south side of the channel, to the perch at the north-east part of the Mussel bank, then round the latter mark at the distance of one cable for Diganwy point, and bring the eastern turret of the castle, on the north side of the town, open of Bodlondeb point, which is the mark for clearing the low-water shore of the latter; anchorage may then be taken up abreast the town, in 2 or 3 fathoms, as soon as the archway, half-way along the quay, bears West.

Vessels drawing 10 or 12 feet must be careful to keep close to mid-channel, even at high-water, for the passage is very narrow.



Conway, a creek of Beaumaris, is 14 miles by rail from Bangor and 45 from Chester; on the opposite side of the river a branch line runs to Llandudno, and another up the valley of the river to Llanrwst and Bettys-coed.

The population in 1881 was 3,179.

**GREAT ORME HEAD.**—This head is one of the finest objects on the coast, and extremely useful as a distinguishing mark. Its northern face is a steep limestone cliff bold to, from whence the ridge or head extends south-easterly for  $1\frac{3}{4}$  mile, the highest part being elevated 676 feet. At a height of 664 feet, and upon near the centre of the ridge of the head, is one of the telegraph stations formerly used in connection with Holyhead and Liverpool.

**LIGHT.**—Upon the north point of Great Orme head, a lighthouse was erected in 1862; the tower is a square castellated building, of grey stone, and from it, at the height of 325 feet, a *fixed* light is shown, which is visible at the distance of 24 miles, between the following bearings:—*white* from S.E. by E.  $\frac{1}{8}$  E., through south, to W.  $\frac{1}{2}$  S., and *red* from W.  $\frac{1}{2}$  S. to W.  $\frac{1}{4}$  N.; the southern limit of the *white* light crosses the Four-fathoms tongue and leads towards the entrance of Queen channel, and the south limit of the *red* light cuts the Constable buoy and the bell beacon of Horse channel. From the lighthouse, the N.W. light-ship bears E. by N.  $\frac{1}{4}$  N., distant  $15\frac{3}{4}$  miles; the buoy of the Constable is distant 6 miles; north-east end of Puffin island, W.  $\frac{3}{4}$  N.,  $5\frac{1}{2}$  miles; point Lynus lighthouse, N.W.  $\frac{5}{8}$  W.,  $15\frac{3}{4}$  miles; Morecambe bay light-vessel, N.E.  $\frac{1}{4}$  N., 36 miles; and Walney lighthouse, N.E.  $\frac{1}{2}$  E., 49 miles.

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## CHAPTER V.

## GREAT ORME HEAD TO FORMBY POINT.

VARIATION IN 1884.

Liverpool bay      -      -      - 20° 10' West.

**ORME BAY.**—The north-east face of the Great Orme trends from its head S.E.  $\frac{3}{4}$  E.  $1\frac{1}{4}$  mile to Pen Trwyn,\* which, like the head, is a bold cliff, steep-to; between them, Llandudno church, a small white building with a belfry, within a circular enclosure, stands back a few hundred feet from the cliff. Pen Trwyn is the north-west boundary of Orme bay; the coast from it turns abruptly S. by W. half a mile to the south-east toe of the head, and then curves round, with a sandy beach, to Little Orme head.

**LLANDUDNO.**—The margin of Orme bay, on which a few years ago there was only the fishing village of Llandudno, is now occupied by long terraces of handsome stone houses, large and commodious hotels, St. George church, and other buildings, forming altogether a considerable town, which is much resorted to as a watering place; it is connected by a branch line of  $3\frac{1}{4}$  miles with the Chester and Holyhead railway at Conway, and steamers between Liverpool and Beaumaris call off the bay when weather permits.

**Pier and Light.**—At the foot of the Great Orme, a promenade and landing pier, of iron, 416 $\frac{3}{4}$  yards in length, extends in a N.E. by E.  $\frac{3}{4}$  E. direction, having at its outer end a depth of 10 $\frac{1}{2}$  feet at low-water of spring tides. A *fixed green* light is shown at the pier head. A *red* light is exhibited under the green light when vessels cannot go alongside the pier; a *red flag* by day answers the same purpose.

**Life-Boat.**—A life-boat is stationed at the south-west side of the bay near the town.

The bottom of the bay, being mostly shingle, is bad holding-ground, but, as there is very little stream of flood or ebb within the line of the

\* See Admiralty chart, England, west coast, Holyhead to Liverpool, Eastern sheet, No. 1,170b; scale,  $m = 1.0$  inch.

heads, coasters often remain in it for a tide in fine weather. Small vessels, with coals for the copper mines, or loading the ore, commonly use the beach.

**Little Orme Head**, with its high background, somewhat resembling the Great Orme, though much smaller, and not quite so steep-to, is the first headland passed in the track outwards from the Dee. The small creek, Porth Dynieved, is between the head and Whitechurch hill, a remarkable feature just to the south-eastward of it. From little Orme head, the coast trends S.E. by S. for  $1\frac{1}{2}$  mile to Rhôs point, which is low and flat, with a small ruin on it, and fronted by loose stones out to the low-water margin. The dark-coloured square tower of Llandrillo church is on a rising ground rather more than half a mile within the point.

**Rhôs Bay** is bounded south-easterly by Tanpenmaen head, which is S.E.  $\frac{1}{2}$  S.,  $2\frac{1}{2}$  miles from Rhôs point; it is half a mile deep, with a high-water boundary of shingle fronted by sand; and the low-water shore, which dries out for one cable, has some large rocks and stones about the head. The anchorage is good, with off-shore winds.

**CONSTABLE BANK**, in connection with the outermost of the sands encumbering the approach to the river Dee, has its north-west extremity, which is called Four-fathoms tongue, E. by N., 4 miles from Great Orme head lighthouse, and N.N.E. 3 miles from Little Orme head; thence the bank extends S.E. by E.  $\frac{1}{2}$  E. for 8 miles, when, including some patches of one and two fathoms, it becomes merged in the banks fronting the Dee. At its extremity it is very narrow, but at the distance of 6 miles, where it is named Four-fathoms flat, it has a breadth of three-quarters of a mile from 4 fathoms on each side, the whole mass being fine sand. A great portion of the bank about its centre, under the name of Three-fathoms ridge, has as little as 13 feet upon it, and at its eastern extreme is a flat of from 6 to 9 feet.

**Buoy.**—A conical buoy, with staff and diamond, and *striped black and white horizontally*, is moored in 22 feet at the north-western or outer end of the ridge; from it, Puffin island, its apparent length open north of Great Orme head, bears W.  $\frac{1}{2}$  N.; Great Orme head lighthouse, W.  $\frac{1}{4}$  N., distant 6 miles; Little Orme head, S.W. by W.  $\frac{3}{4}$  W.,  $3\frac{1}{2}$  miles; Llysfaen telegraph, S.  $\frac{3}{4}$  W.,  $5\frac{1}{2}$  miles; and the north-west Patch buoy, E.S.E.,  $6\frac{1}{2}$  miles.

Penmaenmawr, kept over the south-east toe of the Great Orme, bearing W.S.W., leads one mile to the north-westward of the Constable buoy and Three-fathoms ridge, and across the Tongue in  $3\frac{1}{4}$  fathoms at low-water.

**COAST.**—On the summit of the high land, which rises gradually from Tanpenmaen head to 709 feet above high-water, is Llysfaen telegraph, between that on the Great Orme to the north-westward, and another near the mouth of the river Clwyd to the eastward. The coast from Tanpenmaen head trends S.E. by E.  $\frac{3}{4}$  E. for  $1\frac{1}{2}$  mile to the outlet of the valley of Llandulas, from whence a stream issues, and is lost in the shingle lining the shore; then the coast sweeps south-easterly for one mile, and joins the frontage of the western end of Rhyddlan marsh, where a base line of 24,514 feet was measured, under the direction of the late General Mudge, for the purpose of the ordnance trigonometrical survey.

**Life Boat.**—A life-boat is stationed at Llandulas.

The white square tower of Abergelé church stands half a mile back from the coast line at the west end of the marsh, and the flat and shallow frontage has received the name of Abergelé road, but, as the depth in it is less than 2 fathoms, it is only adapted as a stopping-place in off-shore winds for small vessels pursuing an in-shore track. Gwrych castle, an extensive building surrounded by trees, is a conspicuous object upon the face of the hill midway between Llandulas and Abergelé.

From the cottage of Pen-y-Sarn, at the west end of Rhyddlan marsh, the coast, for 3 miles to the mouth of the river Clwyd, is flat, with a foreshore composed of shingle and sand, half a mile wide at low-water.

**River Clwyd and Rhyl.**—Three-quarters of a mile west of the town of Rhyl is the outlet of the united rivers Elwy and Clwyd; the Elwy is swelled by many streams falling from the high land about Moel Saesiog, elevated 1,533 feet, having a general course from the south-west; and the Clwyd winds for about 21 miles through the beautiful vale of that name, to the junction between St. Asaph and Rhyddlan, at about 5 miles from the outlet; by some the stream below the junction retains the name of the Clwyd, but by other authorities it is called the Elwy.

The entrance to the river from the sea is straight for about half a mile, and then curves in south-west for between the high-water points. There is one perch at the turn upon the west side; and two perches, for leading up the entrance reach, upon the east side, the inner one being at the high-water mark.

A small quay immediately within the western point admits vessels of 13 feet draught alongside it at high-water; and two quays upon the eastern side, having a similar depth, are chiefly used by passenger steamers. The railway crosses the river a little above the pier, so that no vessel can pass up to Rhyddlan, a distance of about 2 miles, unless with

lowered masts; below the railway bridge is the Foryd toll sliding bridge upon rollers.

**TIDES.**—It is high water, full and change, at the entrance of the river Clwyd, at 10h. 37m.; abreast the jetty the rise is 15 feet on equinoctial springs, 13 feet on ordinary springs, and 11 feet at neaps.

**Life Boats.**—A tubular life-boat is stationed upon the west side of the river, and one of the ordinary description near Abergelé; there are also life-belts and lines at the coast-guard station.

**Rhyl.**—The town of Rhyl, which is resorted to for sea-bathing, stands three-quarters of a mile to the eastward of the Clwyd; its extensive terraces of superior houses, hotels, and other erections, making it a prominent object from the sea.

**Pier.**—Fronting the principal hotel, near the centre of the town, a promenade pier projects about north for 750 yards; at the head there is a depth of 16 feet at springs, and 10 feet at neaps.

**LIGHT.**—A *fixed white* light is shown at the pier-head all night.

The population of Rhyl, was, in 1881, 6,034.

**COAST.**—The point of Air, at the entrance of the Dee, is E.  $\frac{1}{2}$  S., distant 7 miles from the river Clywd, and the whole of the intermediate shore is a low shingle beach, having a breadth of from three-quarters to half a mile, with a margin of fine sand at low-water. The objects which principally attract attention are the smelting works of Tal-y-Goch, standing on the abrupt eastern falls to the valley; then Gwaunyscor height of 680 feet; Voel Nant, of 764 feet, on which is a telegraph; one-third of a mile farther eastward, St. Elmo summer-house, elevated 774 feet; and, lastly, on the easterly slope of the same ridge, the mansion of Talacre.

**Life-Boat.**—On the shore nearly abreast the latter, and W.  $\frac{1}{2}$  N.,  $1\frac{2}{3}$  mile from Air point, is a life-boat, which is maintained by the Mersey Docks Board.

**RIVER DEE.**—The river Dee flows from the lake of Bala, in Merionethshire; this mountain lake discharges its waters in a considerable stream at its north-east corner, and is soon after joined from the north by the Tryweryn and the Alwen, near the town of Corwen,  $15\frac{3}{4}$  miles from the lake; the river then takes an easterly course through Denbighshire by the vale of Llangollen, and from Trevor by numerous windings, first towards the south-east, and then northward, for the city of Chester, which it skirts along the southern side. Soon afterwards, entering an artificial cut, the Dee discharges into a broad estuary at St. Mark,  $8\frac{1}{2}$  miles below the city,  $14\frac{1}{4}$  miles from Alford,  $34\frac{1}{2}$  miles from Bangor in a detached portion of

Flint, and 84 miles from its outlet from the lake; the principal tributaries, besides those already mentioned, are the Ceriog from the south-west, and the Alyn from the north-west. The estuary of the Dee is about 12 miles in length from the artificial cut near Connah quay, St. Mark, to its outlet between Air point the north-east corner of Flintshire, and Helbre point the north-west corner of Cheshire, where it is  $4\frac{1}{2}$  miles across.

**AIR POINT.**—Close to the high-water limit at Air point, which is low, stands a circular disused light-tower, 65 feet high; it has a red top, and is painted with red and white horizontal bands.

**HELBRE ISLETS**, three in number, are all connected by a low plateau of rock level with the sand. The inner or southernmost islet is very small and low, but may be easily distinguished by a large wooden beacon erected on it, called the Eye. There is also another wood-frame beacon, called Beach mark, situated on the sand one-quarter of a mile eastward of Great Helbre islet. The middle islet is rather less than half the size of the outer islet, but is nearly of the same height and character.

**Great Helbre** is nearly one-third of a mile long, in a north and south direction, narrow, and 40 feet high. Low-water rocks extend to one cable from its north extreme, and close to the deep water of the eastern channel called Helbre swash, the islet therefore makes a very useful sailing mark for passing vessels. The Mersey Docks Board has a signal and electric telegraph station here, also a tide-gauge; and the Corporation of the Trinity House, London, has a buoy store. There are two houses on the islet besides several sheds.

**Life-Boats.**—A life-boat is kept in a shed at the north point of Great Helbre islet, and another boat is on the beach  $1\frac{3}{4}$  mile westward of Air point (disused) lighthouse; both life-boats belong to the Mersey Docks Board.

From Air point on the one side, and Helbre point on the other, the shores of the estuary of the Dee gradually converge and reduce its width from  $4\frac{1}{2}$  miles at the outlet to  $1\frac{1}{2}$  mile at the point, where the embankments of the river begin.

**DEE LIGHT-VESSEL**, moored at the entrance of the river Dee, about one mile N.E. by E.  $\frac{3}{4}$  E. from Air point, exhibits, at 80 feet above the water, a light showing a *white flash every ten seconds*.\*

The vessel is painted red, with "River Dee" on her sides, carries a ball at the masthead, and lies in 8 fathoms at low-water, with St. Elmo summer-house open westward of Air point disused lighthouse, twice the breadth of

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\* See Regulations respecting light-vessels, and vessels for marking wrecks, at page 80.

the tower, bearing S.W. by W.  $\frac{3}{4}$  W.; S.E. Air buoy, S.  $\frac{1}{2}$  E., distant 4 cables; and South Hoyle buoy, W.N.W.,  $2\frac{8}{10}$  miles.

**Fog Signal.**—During thick or foggy weather a gong is sounded.

**SANDS.**—Nearly the whole of the wide estuary of the Dee is occupied by sands and flats which dry at low-water, and the approaches to the same being also similarly encumbered, constitute an intricate and dangerous navigation. The following is a brief and general description of the various sands, &c., beginning with the most western; it must, however, be remarked that they are subject to constant change.

**CHESTER FLATS.**—The great extent of shallow and sandy patches which commence from near Rhôs point and extend to 4 miles in the offing abreast the town of Rhyl, are known by the general name of Chester flats. They are composed of sand mixed with fine gravel and shells; several ridges occur abreast the town of Llandulas, the outermost of which, with 6 feet upon it, is  $1\frac{1}{2}$  mile off shore. The next group, named Rhyl flats, off the town of Rhyl, has several patches of 6 feet at 2 miles off shore, and two patches of that depth lie  $1\frac{1}{2}$  mile farther out, at what may be termed the inner end of Constable bank. The whole of these ridges are based upon a flat with not more than 2 or 3 fathoms upon it at low-water.

**MIDDLE PATCH BANK** lies to the eastward of and between Chester flats and West Hoyle bank; thus breaking up the western entrance of the river Dee into two channels, known as the Welsh channel and the Inner passage. The most elevated part of the bank lies toward the south-east end where it dries nearly 4 feet at low-water; and the part nearest the shore assumes a ridgy, narrow, and serpentine form, from which it has probably obtained its name of the Earwig.

**BUOYS.—Earwig.**—Its inner or south-east extreme is marked by a *bell* buoy, named Earwig, which is *striped horizontally black and white*, and lies in 9 feet at low-water, W.N.W., distant  $2\frac{2}{3}$  miles from Air point (disused) lighthouse, and only one-third of a mile from the low-water margin.

**N.W. Patch.**—From Earwig buoy, the bank (dry at low-water) extends in a direction N.W. by N. for  $2\frac{1}{2}$  miles; when it spits off to the northward, and unites with Chester bar, whilst from the western side of the bank a tail of shoal water (6 to 12 feet) extends to the W.N.W. for about  $2\frac{1}{2}$  miles; its extreme being marked by a *black* cone buoy, with staff and cross, named N.W. Patch; which lies in 16 feet at low-water.

From N.W. Patch buoy the town of Rhyl bears South, nearly  $3\frac{1}{4}$  miles distant; the Constable buoy, W.N.W.,  $6\frac{1}{2}$  miles; and Chester bar buoy, E. by N.  $\frac{1}{2}$  N.,  $2\frac{2}{3}$  miles.

**N.E. Middle Patch**, *black* can, lies in 12 feet at low-water off the north-east spit of Middle patch.

**CHESTER BAR** has 14 feet over it at the lowest spring tides, and in moderate weather its passage is not difficult to those acquainted with the marks. Strangers approaching it, however, without a pilot, and intending to enter the Dee, should in no case attempt to do so on an ebb tide, for the sand-banks shift so quickly, that should a vessel touch at that period and remain fixed she would probably be lost, through the sand under her bilge washing away and causing her to fall over on her beam ends. Also, too much dependence must not be placed upon the buoys intended to mark the different channels being in their proper places, for (perhaps owing to gales of wind and continual change in the bed of the estuary) they are sometimes found where they are of but little use and might even mislead.

**Chester Bar Buoy**, a *black* and *white vertically striped* conical buoy, lies in 12 feet at the north-west extreme of West Hoyle spit; with Brynllystin house (in a clump of trees on the shoulder of the hill above Talacre house), just open eastward of Talacre life-boat house, bearing S.S.E.  $\frac{1}{2}$  E.; point of Air (disused) lighthouse, S.E.  $\frac{1}{4}$  S., distant  $5\frac{1}{2}$  miles; Rhyl church, S.S.W.  $\frac{3}{4}$  W.,  $4\frac{1}{10}$  miles; and N.W. Patch buoy, W. by S.  $\frac{1}{4}$  S.,  $2\frac{1}{2}$  miles.

The deepest water on the bar will be found by passing over it at the distance of one cable to the westward of this buoy; or, keep Brynllystin house in line with the left gable of Talacre life-boat house on the beach, bearing S.S.E.  $\frac{1}{2}$  E. easterly.

**The Inshore Passage** between Chester flats and Middle Patch bank is much used by coasters, drawing 10 to 12 feet, after quarter-flood. It is easier to navigate than the eastern passage on account of the streams of both flood and ebb being slacker and setting fairly through it; moreover, being near the land, sailing marks are more readily made out than farther off on Chester bar.\* But there are several patches with not more than 10 feet water in this passage, and only 9 feet between the Earwig and the beach, where the channel, with that depth in it, is contracted to  $1\frac{1}{2}$  cable by a spit from the shore. The Earwig *bell* buoy, which marks the nip (or narrowest part) of the channel on the off side, should be rounded at the distance of half a cable.

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\* It should be noticed that a dense haze, caused by the numerous mining works and factories, generally obscures the land about the estuary of the Dee even during the finest weather.



**WEST HOYLE BANK** lies immediately fronting the estuary of the river Dee, and is one of the most extensive banks in the neighbourhood, the greater part of it uncovers at low-water springs, and then measures about 12 square miles; the eastern end of the bank drying 23 feet, and its western part 13 feet. A narrow and shallow swashway separates the latter from the great body of the bank at low-water.

The bank is very steep along its inner or southern boundary, as well as to the eastward in Helbre swashway; but less so on its western side facing Welsh channel; and its northern part slopes off into irregular and dangerous shoals extending about one and a quarter mile from the general mass which dries at low-water. The northern and western limits of the bank are well marked by buoys.

**BUOYS.**—**West Hoyle**, a *black* and *white horizontally striped* conical buoy, carrying a staff and diamond, lies in 6 fathoms at low-water, in a position where it serves as a fairway buoy for Chester bar, and marks the spit of West Hoyle sand; with Grange hill monument, in line with the south end of Little Helbre islet, bearing S.E. by E. southerly; Brynllystin house, just open westward of Talacre mansion, S.S.E.  $\frac{1}{4}$  E.; and Rhyl pier-head, in line with the second westernmost block of houses at Rhyl, S.S.W.  $\frac{1}{4}$  W. The extreme north-west point of the bank outside West Hoyle spit is well marked by Chester bar buoy, already described, and next within the bar on its south-western edge lies

**S.W. Hoyle**, *striped vertically black* and *white* can, in 18 feet, S.E. by S.,  $2\frac{1}{2}$  miles from the Bar buoy.

**Hoyle Spit**, a *black* and *white vertically striped* conical buoy, lies in 15 feet; with Grange hill monument, in line with Helbre Eye beacon, bearing E.S.E.; Brynllystin house (on the summit of a hill) open westward of Talacre mansion, S.S.E.  $\frac{1}{4}$  E.; S.W. Hoyle buoy, N. by E. northerly, distant half a mile; and Earwig buoy, S. by E.,  $1\frac{2}{3}$  mile.

**South Hoyle**, *chequered black* and *white* can, in 24 feet, marks the south-west angle or bend of West Hoyle bank. From it, S.W. Hoyle buoy bears N.W.  $\frac{1}{4}$  N., distant  $1\frac{1}{2}$  mile; Prestatyn church is seen open westward of the vitriol works, S.W.; point of Air (disused) lighthouse, S.E.  $\frac{1}{4}$  E.,  $2\frac{1}{4}$  miles; and Earwig buoy, S.W. by W., one mile.

The eastern boundary of West Hoyle bank is guarded by five *red* can buoys, marked, respectively, H.E. 1, to H.E. 5; the latter being nearly abreast the north end of Helbre islet.

**MOSTYN BANK** \* comprises the whole of the south-western flat fore-shore of the Dee estuary, and varies from over one mile to about

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\* See Admiralty chart of Liverpool bay, No, 1,951; scale,  $m = 2.0$  inches.

half a mile in breadth, from Air point to 5 miles above it, where it becomes broader and takes the name of Bagilt bank, &c.

**BUOYS.**—The edge of this flat is marked at intervals by buoys, as follows :—

**Air point.**—A *black* can buoy lies close to the sand off Air point.

**S.E. Air,** is a *black* can, in 18 feet, and marks a projecting shoulder of Mostyn bank, from whence a bar (having only 9 feet at low springs) lies right across the channel in the direction of Salisbury Middle buoy, and thus unites it with that bank. Just within this bar is the anchorage called Wild road, which name exactly describes its character.

Within S.E. Air buoy, Mostyn bank holds nearly straight for  $2\frac{1}{2}$  miles, when its edge is again marked by a *black* can buoy, M. 1, just off the entrance to Mostyn gutter, leading to Mostyn village, the position of which may be further known by a large perch on its southern side. Another buoy of similar character, marked M. 2, lies on the margin of the bank a mile above M. 1 buoy. At the distance of rather more than half a mile above M. 2 buoy, but on an elbow of the opposite bank, where the stream becomes narrowed to one cable, is another can buoy, M. 3, *striped vertically black and white*.

The channel on this side of the estuary terminates  $2\frac{3}{4}$  miles above Mostyn, abreast the village of Greenfield; the place being marked by a *red* can buoy named Greenfield Gut.

**SALISBURY BANKS,** within West Hoyle bank, occupy a large portion of the middle of the estuary of the Dee, which at low-water is thus divided into two distinct channels. A swashway of considerable magnitude separates a large portion to the north-westward from the main body; this is called

**Salisbury Middle Bank,** the northern part of which commences abreast Air point, and, as already noticed, is connected with Mostyn bank by a bar, marked on its outer extreme by Salisbury Middle buoy, is nearly  $1\frac{1}{2}$  mile long and about one mile wide, and its highest part, near the middle of its western side, dries 13 feet at low-water.

**BUOYS.**—**Salisbury Middle,** a conical buoy, *striped horizontally black and white*, and carrying a staff and triangle, lies in 12 feet at the north extreme of this bank, East,  $1\frac{1}{2}$  mile from Air point (disused) light-house, and half a mile outside S.E. Air buoy, on the same line of bearing. The western edge of the bank is marked by a can buoy, S.W. Salisbury, *striped vertically black and white*, in 12 feet; and there is a *chequered black and white* can buoy, named Salisbury Swash, lying near its south

end, well out in the channel. This bank lies nearly parallel to Mostyn bank and forms the eastern side of Wild road, and of the channel leading to Mostyn deep and the anchorage off Holywell.

**Great Salisbury Bank**, lying close to the eastward of Salisbury Middle bank, and separated only by a very shallow swashway, called Welshman Gut, from the south-east angle of West Hoyle bank, extends upwards for 4 miles; beyond this distance the numerous shallow channels by which it is traversed lessens its distinctive character, and it becomes finally merged in the vast flats stretching out from the shore. The north point of the bank lies about  $1\frac{1}{2}$  cable to the eastward of Welshman Gut buoy, and dries from 3 to 6 feet at low-water. From it, Hoylake church is seen over the north point of Little Helbre island, bearing E.  $\frac{3}{4}$  N.; and Grange hill monument is a little open southward of Eye islet beacon, E.S.E.

From its north extreme the bank trends upward about S.S.W., for  $1\frac{1}{4}$  mile, and rises to a height of 10 feet dry at low-water; this portion of the bank is narrow, but, beyond, its eastern side preserves a regular concave line to the eastward towards Dalpool anchorage, while the western side trends off towards Mostyn, opposite which place the bank dries 15 feet and then turns to the southward and eastward.

**Buoys.**—The buoys marking this bank on its eastern side, to as far as the Deeps, are *red* cans. Rather more than one mile within its north point is the East Salisbury; S.E.,  $1\frac{1}{4}$  mile from which is Salisbury Bar buoy; then, three-quarters of a mile S.E. by E.  $\frac{2}{3}$  E., the bank is again marked by a similar buoy named East Bar; and  $1\frac{1}{4}$  mile still farther, and in nearly the same direction, is another *red* can buoy named Deeps: this latter marks the eastern angle or elbow of the bank fronting Dalpool anchorage, and is distant from the Cheshire shore about one-third of a mile. Nearly one mile southward of the Deeps buoy, on the edge of the bank, is Great Salisbury can buoy, with *black* and *white vertical stripes*; and to the westward on the dry bank, between the Deeps buoy and M. 3 buoy, is the South Salisbury, a can buoy *striped vertically black and white*, with staff and ball.

**Welshman Gut** is a narrow swashway separating West Hoyle from Great Salisbury bank, and forms the only channel of communication between the opposite banks of the Dee estuary at low-water, at which period the swashway is less than one-quarter of a mile wide, and not more than six feet deep.

**Buoy.**—A can buoy, *striped horizontally red and white*, and marked Welshman Gut, lies in 18 feet, near the south-east extreme of West Hoyle

bank, at the eastern entrance of the gut. This buoy must be passed to the southward.

**LIME WHARF BANK**, the broad flat on which Helbre islets are based, projects from the eastern or Cheshire shore, for  $2\frac{1}{2}$  miles south of Helbre point, with a breadth of  $1\frac{1}{2}$  mile, while abreast Seldom Seen rock it extends out as a long curved spit to the distance of  $1\frac{1}{2}$  mile from the shore into the estuary of the Dee. The outer part of the bank, although drying 3 feet at low-water, and dangerous from its position and character, is not marked. There are, however, two can buoys marking its south-west side near Dalpool; one, named Lime Wharf, *striped vertically red and white*, nearly opposite East bar buoy; the other, nearly one mile to the south-eastward, named Caldy, is *chequered red and white*. There is also a cone buoy, *chequered red and white*, on the north side of Seldom Seen rock, and half a mile within the spit from the Lime Wharf; and a *black* cone buoy, HE. 5, on the edge of the bank abreast the south point of Great Helbre islet.

**EAST HOYLE BANK** extends 4 miles outside, or to the northward of Helbre point and islets, being in fact a continuation of the Lime Wharf, and forms the eastern boundary of the channel leading into the Dee estuary, and which is known by the name of Helbre swashway. The middle of the bank dries from 6 to 10 feet at low-water, but near to Helbre island it is much higher. At this part there is a narrow gutter across it parallel to the beach and passable by boats at half-tide.

**Buoys.**—The northern edge of East Hoyle bank is marked by a *red* can buoy, H. 1, carrying a perch; and along its western margin bordering Helbre swash there are placed, at nearly equal intervals, four *black* nun buoys, marked HE. 1 to HE. 4; the first being situated about three-quarters of a mile within the outer extreme of the bank, and the last nearly one mile to northward of Great Helbre islet.

**Anchorage** in Wild road is very good during moderate weather, but in Mostyn deep there is more room and far better shelter. Anchor in 4 fathoms near the middle of the deep.

On the eastern side of the estuary, Dalpool deep is a very secure anchorage, and it is in some respects more convenient than either of the others. Landing can be effected at any time of tide, and the town of Birkenhead lies within easy walking distance.

**Water** is more easily obtained at Dalpool than at any other place within the estuary.

**Pilots.**—Chester and Parkgate pilots are seldom to be procured at Chester bar, but the Liverpool pilots are empowered to take charge of any

vessels as far as Wild road and Dalpool, where, as well as at Helbre island, Chester pilots may be obtained. Pilots and steam tugs may be procured off the point of Air towards and during spring tides.

**Directions.**—Vessels approaching Chester bar should wait the flow of the tide to cross. There was 14 feet on the deepest part at low-water at the period of the Admiralty survey in 1870, but it is highly probable that heavy gales and winter floods of the river may cause the bar to vary considerably. Should there be any swell on, the broken water on West Hoyle spit and Middle patch will give unmistakeable distinctness to the passage between them.

**Welsh channel**, from the northward.—West Hoyle bank will be cleared by keeping Crosby lighthouse open northward of Horse channel bell beacon, bearing East; or do not bring Great Orme head to the northward of W.  $\frac{1}{4}$  N. until Brynllystin house appears just open eastward of Talacre life-boat house, S.S.E.  $\frac{3}{8}$  E., which mark will lead over the bar and up Welsh channel until Grange monument is in line with the light-vessel and open a little southward of Eye beacon, bearing E. by S.  $\frac{5}{8}$  S. With this latter mark run up towards Dee light-vessel, which should be left on the starboard hand, and if proceeding to Welshman gut continue on this mark passing to the southward of the *horizontally striped red and white* buoy. If proceeding to Mostyn deep, on arriving abreast the light-vessel, steer S.S.E.  $\frac{1}{2}$  E. for half a mile, pass between the S.E. Air buoy and Salisbury Middle buoy, and steer about S.  $\frac{1}{4}$  E. through Wild road, and then S.S.E.  $\frac{3}{4}$  E. into Mostyn deep. The best line for anchoring in Wild road will be found with Air (disused) lighthouse bearing W. by N.  $\frac{1}{2}$  N.; and in Mostyn deep with Air lighthouse N.W., and Mostyn perch S.W. by S., in 4 to 5 fathoms.

**By night**, Welsh channel can only be taken with a leading wind and by skilful pilots; even under such favourable circumstances there must be considerable risk, as some of the banks are so steep that the lead gives but little warning of approach to them; it would, therefore, be highly imprudent for a stranger to attempt entering the Dee by night.

**Inshore Passage.**—Entering the Dee by this channel, pass westward of North-west patch by keeping Rhyl church a little open west of the house at the end of the pier, bearing S. by E.  $\frac{3}{8}$  E., until the shoulder of Heswell hill comes in line with Talacre life-boat house, S.E. by E.  $\frac{3}{8}$  E., which mark will lead one-third of a mile to the southward of Earwig bell buoy; round the buoy at the distance of a half or three-quarters of a cable, and enter Welsh channel.

**Helbre Swash**, lying between East and West Hoyle banks, is a good channel carrying from 4 to 10 fathoms water, but it has a bar of only 9 feet at its entrance, and it is generally rather narrow, not averaging more than one-third of a mile in width throughout its entire extent. The bar lies 4 miles N. by W. from Great Helbre island.

**Buoy**.—The fairway on the bar is marked by a pillar buoy, painted with *red, white, and black, vertical stripes*, lying in 12 feet, and bearing S.E. southerly, distant  $9\frac{1}{4}$  miles from N.W. light-ship.

**CAUTION**.—The streams of flood and ebb set fairly through this channel, and, as the edge of East Hoyle bank is well marked by four *black* nun buoys, and the West Hoyle by five *red* can buoys, a stranger may navigate his vessel in safety under ordinarily favourable conditions of wind and weather. Nevertheless, none but pilots should attempt to move vessels about here or elsewhere within the Dee estuary on an ebb tide.

Salisbury gut, Dalpool deep, Parkgate deep, &c., subject as they are to frequent changes, cannot be safely used without a pilot, and it is therefore unnecessary to furnish directions for them.

**UPPER NAVIGATION**.—Above the line of Heswell and Flint, on opposite shores, the estuary is nearly wholly occupied by sands, and the navigation is most difficult. Vessels are constantly taking the ground, though in pilot charge, and, from being thus impeded, they seldom reach Chester in one tide. The shallow and shifting channels between Parkgate and Flint are fordable from half-ebb to half-flood, but many persons have lost their lives in crossing, by the tide overtaking them. No description of such a navigation will therefore be attempted, but a brief notice will be given of the various shipping-places on the banks of the Dee between the sea and Chester.

**Mostyn quay**,  $2\frac{3}{4}$  miles within Air point.—Vessels drawing 12 feet reach it at springs, and those of 6 feet at neaps. Large quantities of coal are shipped from the pits in the neighbourhood. There is an open dock, affording considerable accommodation alongside the quays, which is connected with the navigation of the Dee by a straight cut across the fore-shore, having a *black* warping buoy a little south of the entrance. The Chester and Holyhead railway passes close to the head of the harbour, and has a station there.

Mostyn is a creek of Chester custom-house.

At **Greenfield**, 3 miles above Mostyn, vessels of 11 feet draught may be admitted at springs, and those of 5 feet at neaps.

At **Bagilt**, or Dee bank, 2 miles higher up, are large smelting works, which employ many small vessels in the conveyance of lead, copper, and other ores. Vessels of  $8\frac{1}{2}$  feet draught reach it on springs, and those of  $2\frac{1}{2}$  feet at neaps.

**Flint**, although the county town, has but little trade; it is chiefly remarkable for the ruins of its old castle, standing close to the shore. Vessels of from 100 to 200 tons are here built, as they are also at Connah quay, and such of 9 feet draught reach Flint at springs, and those drawing 3 feet at neaps. A market-boat leaves Flint every day with the first of the flood for Chester, returning again on the following ebb.

**Connah quay** is also a creek of Chester custom-house.

Connah quay is  $7\frac{1}{2}$  miles below Chester, and nearly at the point where the estuary has been abruptly contracted by artificial embankments. Here vessels lie afloat at low-water, and timber ships discharge their cargoes, which are rafted up to Chester. Vessels drawing  $11\frac{1}{2}$  feet may reach it at springs, and those of  $5\frac{1}{2}$  feet at neaps.

Connah quay is connected by railway with Wrexham, besides being, with other places named, on the Chester and Holyhead line.

At **Queensferry**, 2 miles above Connah quay, there are quays, and a considerable trade in coals, slate, tiles, bricks, and patent fuel. At low-water there is not more than 2 or 3 feet, but vessels of  $10\frac{1}{2}$  and 5 feet draught reach it at springs and neaps, respectively. Besides this ferry there is another across the river, one mile below Saltney, both of which are free.

At **Saltney**, the property of the Great Western railway company, one mile below Chester, there are good quays, and a brisk trade is carried on in vessels of from 100 to 150 tons burden, chiefly in coals, iron ore, china clay, &c. A branch of the Great Western railway connects it with Shrewsbury and the interior, and another branch, from near it, with Mold and Denbigh.

**Bore of the Dee.—Caution.**—It is necessary for vessels navigating the Dee to guard against the tidal bore to which the river is subject; it begins abreast Rockfield, one mile below Connah quay, attains its greatest height of 2 feet at Sandycroft, and moves at the rate of 8 miles per hour. The first of the flood is generally the strongest, and vessels lying alongside quays should look well to their fastenings, for much damage at times takes place from neglecting this precaution. The bore is not dangerous to boats if they are in the middle of the river, but upon the shore they are liable to be swamped or stove.

**Towage.**—Two steam-tugs are stationed in the Dee, and have plenty of employment at spring tides; the usual practice is to tow several vessels

at the same time, slipping and leaving behind any that take the ground this frequently occurs, and vessels are often injuriously strained in consequence. The charge for strangers between Wild road and Saltney is 20 shillings.

As the river is only navigable for vessels of 9 feet draught at springs, it is the cause of much delay. Vessels of a larger class usually go down light to Mostyn deep, and there take in their cargoes, which are conveyed in flats from Chester and the other shipping-places.

**TIDES.**—Is is high-water, full and change, at Air point, at 10h. 54m.; equinoctial springs rise 32 feet, ordinary springs 25 feet, and neaps 19 feet. The rate of the stream in Wild road does not exceed 3 knots per hour.

At Connah quay the duration of the flood is for 2h. 5m., and that of the ebb 10h. 23m.; the rise of average springs is 14 feet, and of neaps  $6\frac{1}{2}$  feet.

At Saltney, and Cranes wharf, Chester, it is high-water 53 minutes later than at Liverpool, a high spring rising 12 feet, an ordinary spring 10 feet, and the duration of the flood is about two hours, and of the ebb 10 hours; this shortness of the flood is caused by a weir across the river at the city over which the tide only rises upon springs.

**CHESTER**, a city and county of itself, is 179 miles by railway from London and 21 miles from Liverpool; it stands upon a rocky elevation on the north bank of the Dee, by which river it is nearly half surrounded. There are many handsome erections within the city, such as the cathedral, exchange, and castle, the latter a splendid structure, built upon the site of the ancient castle, nearly all of which has been removed. The river is crossed by one railway, and two road, bridges; the new road or central bridge having but one arch of 200 feet span. Chester had formerly a far larger and more important trade than that of late years. Now only vessels of small burden, carrying from 100 to 150 tons, go up to the quay at Saltney, and to Crane wharf and Cheese stage, below the railway bridge. At the wharf, vessels will lie afloat at low-water if not drawing more than 7 feet, but at the stage with a draught of 12 feet. The imports are chiefly of a general character, and the exports, cheese, copper plate, and cast iron; there are some manufactories of tobacco, shot, and leather. A few vessels are built of from 100 to 200 tons, as also at Saltney. The custom-house returns for 1882 were as follows:—The number of vessels belonging to the port, 124=9,980 tons; Coasters, inwards, 2,274=164,147 tons; outwards, 2,288=170,898 tons; Foreign, in, 39=9,840 tons; outwards, 15=3,112 tons. The population in 1881 amounted to 36,788.



## RIVER MERSEY.

The Mersey, forming a natural boundary to the counties of Lancashire and Cheshire, has its commencement 7 miles east of Stockport, where it is constituted by the junction of the rivers Etherow and Goyt, and at Stockport by the Tame from the north-east; the valley of the Mersey is here crossed by a fine railway viaduct. Flowing onward with numerous bends through a level country, the Mersey divides Cheadle from Didsbury, and passing Stretford, Ashton, and Flixton, is joined in the vicinity of Carrington, 29 miles east of Warrington, by the Irwell from Manchester, and from thence, aided by weirs and locks, becomes a navigable river. Augmented by the Bollen from the south, and other smaller streams, the river winds on to Warrington, which is 56 miles from its commencement, beyond Stockport; the banks widen out considerably towards Runcorn, but, at the Gap, 10 miles below Warrington, the breadth is contracted to one quarter of a mile. Here the Mersey is crossed by a railway viaduct of stone, which has three navigable arches of 305 feet each, with a height of 75 feet between the level of high-water and the girders above; these arches are connected to the Lancashire shore by six others of 60 feet span; the total length of the viaduct from shore to shore is 1,404 feet. This imposing structure, part of the scheme of the London and North-western railway company, was opened in the spring of 1869. Two miles below Runcorn the river is joined by the Weaver from the south-east and expands into a wide estuary, the greatest breadth of which is 3 miles across near Ellesmere port. From thence it gradually contracts, and from Dingle point to Rock lighthouse, the last five miles of its course, the river is from one mile to half a mile wide, the narrowest part being between the walls of Princes basin and Seacombe on the Cheshire side. The length of the estuary from Runcorn Gap to Rock lighthouse is 15 miles, and the total length of the Mersey from its source or junction of the before-mentioned streams is 81 miles.

**COAST.—South Side of Entrance**—From Helbre point to Formby point is N.E.  $\frac{1}{2}$  N., 11 miles, within which line as a base, the entrance of the Mersey forms a triangle, the bounding shores approaching nearly to a right angle.

Helbre point, or the Red Stones, and the coast eastward of it, being composed of low sand-hills, are but indistinctly seen from the sea, but the monument on Grange hill,\*  $1\frac{1}{2}$  mile S.S.E. from the point, and the higher

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\* Views of the principal shore and floating objects used for the navigation of the entrance of the Mersey are given on charts. Nos. 1,170 and 1,951.

land of Ireby hill within, are well marked objects. Upon the eastern part of the same range will be observed the square tower of Wood church, and to the north-east of it, Bidston hill, with a lighthouse 68 feet high, and a mill. The towers of the old and new churches of Wallasey are about  $1\frac{1}{2}$  mile N.E. from the lighthouse, and with a mill stand upon the west fall of the eastern rising ground, which is separated from that of Bidston by the low land bordering Wallasey pool and Birket stream; upon the same rise is also a lofty square waterworks tower.

The chief objects upon the lower foreground are, Hoylake hotel, a large building one-third of a mile from Helbre point, the two Hoylake lighthouses, 64 and 42 feet high, and Hoylake church, the latter one mile east of the point. A little within the coast line, and one mile to the eastward of the lower lighthouse, are the two diamond-headed Dove beacons, 200 yards apart, and bearing when in line N. by W. and S. by E. At  $1\frac{1}{4}$  mile beyond, the tall tower of Leasowe lighthouse, 110 feet high, appears a little within the sea embankment, and three-quarters of a mile farther Leasowe castle. Rock lighthouse and the adjacent fort, nearly 3 miles to the eastward of Leasowe castle, are both insulated at high-water; and they, together with a range of low red and yellow sandstone cliffs, and the houses and terrace, and conspicuous church spire of New Brighton, terminate the intervening  $6\frac{3}{4}$  miles of coast between the estuaries of the Dee and Mersey.

A sandy beach skirts the whole of it, and between Hoylake lighthouses and Leasowe castle is a bed of peat and mud, which is well calculated for beaching on without injury to any vessel that may be compelled by stress of weather to go ashore.

**East Side of Entrance.**—Formby point and the coast for 5 miles south of it are composed of low sand-hills, over which, towards high-water, may sometimes be seen the fans of the higher of two windmills and the belfry of Formby church, about 2 miles inland of the point. This boundary of the entrance of the Mersey is distinguished on its north part by a lofty framework beacon, named Formby North-west mark, and on the sand in front of it is another mark, named Mad-wharf beacon. Upon the south part of the point, S. by E.  $\frac{1}{4}$  E., 2 miles from the North-west mark, is the well-known Formby tower; it is of brick, upwards of 100 feet high, and was formerly a lighthouse. Half a mile W. by N. from the tower is the Victoria beach mark; and on the point, between it and the North-west mark, is a life-boat house and flag-staff.

Crosby lighthouse, a wooden structure, 74 feet high, is S. by W.  $\frac{1}{4}$  W. one mile from Formby tower; and W. by N.  $\frac{3}{4}$  N., three-quarters of a mile from the former, is Crosby beacon, a triangular framework of wood surmounted by a ball. At 2 miles S. by W.  $\frac{1}{4}$  W. from the lighthouse is

Crosby point, projecting little from the coast on either side, but having several prominent objects about it, namely, the old and new churches of Crosby, a Roman Catholic chapel, and a windmill. Upon the sands in front of the point are the two north and two south marks of the measured mile for testing the speed of steamers.

Waterloo terrace is close to the high-water margin,  $1\frac{1}{2}$  mile from Crosby point; then succeeds the yellow tower of Seaforth church, and afterwards groups of houses are continued for some distance, and at last become merged in the city of Liverpool.

Above Seaforth church, at the distance of one mile, and nearly opposite Rock lighthouse, is Bootle church and the tall chimney of the water-works, the latter a useful mark for the navigation; and on the brow of Walton hill, one mile inland, stands a lozenge-shaped beacon named Walton or Bootle inner mark. On this elevation are also Walton church and several windmills.

There are many prominent objects in Liverpool, but they are of only limited use in the approach, and are always obscured by smoke in easterly and south-westerly winds.

The bounding shores of the entrance of the Mersey and the general appearance of the principal objects having been described, the various lighthouses and light-vessels, &c, will now be noticed in detail, and in the same order as observed with the coast.

**LIGHTS.—Hoylake Lighthouses** are both white buildings standing N.N.E.  $\frac{2}{3}$  E. and S.S.W.  $\frac{2}{3}$  W. 400 yards from each other; the lights are *white* and *fixed*, are, respectively, 55 and 31 feet above high-water, and are visible at the distances of 13 and 11 miles in clear weather. The upper light opens when approaching the port from the westward when bearing S. by E.  $\frac{3}{4}$  E., the lower or eastern light opens on a bearing of S.  $\frac{1}{4}$  E.; the former indicating the north-west spit of East Hoyle bank when making for Horse channel, the latter when in the fairway between the East Hoyle and the Flats.

**Leasowe Light-tower** is white; the light, *fixed* and *white*, is 94 feet above high-water, and visible at a distance of 15 miles in clear weather. It is masked when bearing southward of S.S.E., the line of obscuration passing about one mile westward of Bar light-vessel.

**Bidston Lighthouse** is of dark-coloured stone; the light, *fixed* and *white*, is elevated 225 feet above high-water, and may be seen at a distance of 23 miles; it is used in conjunction with Leasowe light for leading towards and up a portion of Horse channel. This light is masked when bearing southward of S.S.E.  $\frac{1}{4}$  E., or on a line one mile westward of Bar light-vessel.

**Rock Lighthouse** is a stone tower 94 feet high; the light, 77 feet above high-water, is *white*, and shows a *flash* every *half-minute*, visible at the distance of 14 miles in clear weather. A *fixed white* light is shown from a chamber beneath the flashing light in the direction of Rock channel, and south-eastward towards the river, while there is a depth of 11 feet in Rock gut or channel abreast. A *black* ball hoisted by the side of the lantern denotes the same depth by day.

**Fog Signal.**—A bell is sounded during fog.

**Crosby Lighthouse**, on the eastern or Lancashire side, is built of wood and painted white; the light, *white* and *fixed*, is 95 feet above high-water, and may be seen at the distance of 12 miles in clear weather; it is visible only between the bearings S.S.E.  $\frac{1}{4}$  E. and S.E.  $\frac{1}{4}$  E.; the first bearing indicates the turning point at the entrance of Old Formby channel, and also clears Formby spit in 10 feet; the second bearing cuts Zebra buoy, which is situated 2 miles eastward of Bar light-vessel.

**North Docks Wall Light-house.**—From a lighthouse on the North docks wall at Liverpool is exhibited a *fixed* light, of the first order, at 70 feet above mean sea level; it shows *white* between the bearings N. by E., through east, and S. by E.  $\frac{1}{4}$  E.; and *red* when bearing southward of S. by E.  $\frac{1}{4}$  E.

North Docks Wall light, in line with Rock light, bearing E.  $\frac{1}{4}$  S., indicates the turning point between Horse and Rock channels, and leads between Dove and Spencer Spits. The change in the colour of North Docks Wall light from *white* to *red* indicates the approach to Formby channel from the bay; and, in Crosby channel, shows that the vessel has passed eastward of the line of *black* buoys, and is dangerously near Formby bank.

**LIGHT-VESSELS.**—The light-vessels off, and in the entrance of, the Mersey are four in number, and are named North-west, Bar, Formby, and Crosby.

**NORTH-WEST LIGHT-VESSEL** lies in 13 fathoms in the fairway of the several channels. This vessel has two masts, her hull is painted black with a broad white streak, and "N.W. LIGHT-SHIP" in large letters on her sides, and she carries a black ball at the foremast head. She exhibits one *white* light, which *flashes* every *half-minute*, from an elevation of 38 feet, and may be seen at a distance of 11 miles in clear weather.

**Fog Signal.**—During thick or foggy weather, a powerful steam fog horn gives *four blasts* each of *two seconds* duration, within a period of *fifteen seconds*, followed by silence for *forty-five seconds*, when the short blasts followed by the same interval of silence are again repeated. In the event of a fog coming on so suddenly that the horn cannot be brought immediately

into use, or in case of the horn being disabled, a bell will be sounded. This fog signal is similar to that used at Formby light-vessel.

At the N.W. light-ship, Bidston and Leasowe lighthouses are in line bearing S.E.  $\frac{1}{4}$  E., and the Bar light-vessel is E.  $\frac{3}{4}$  S., 9 miles distant.

The N.W. light-vessel received her name from lying to the north-west of Rock channel, which was formerly the most frequented of the passages into the Mersey, and as she is still the outermost beacon, and serves as a point of departure for the several channels towards Liverpool, some of the principal bearings and distances from her are given.

Air point (disused) lighthouse	-	S. by E. $\frac{2}{3}$ E.	-	11 $\frac{1}{2}$ miles.
Orme head lighthouse	-	W. by S. $\frac{1}{2}$ S.	-	15 $\frac{3}{4}$ "
Lynas lighthouse	-	W. by N. $\frac{1}{8}$ N.	-	27 "
Chicken rock lighthouse, Isle of				
Man	-	N.W. by N.	-	56 $\frac{3}{4}$ "
Morecambe bay light-vessel	-	N.N.E.	-	23 $\frac{1}{2}$ "
Formby north-west black buoy	-	E. $\frac{1}{4}$ S.	-	12 $\frac{2}{10}$ "
Bar light-ship	-	E. $\frac{3}{4}$ S.	-	9 "
Fairway bell beacon, Horse channel	-	S.E. $\frac{1}{8}$ E.	-	8 $\frac{1}{2}$ "

**BAR LIGHT-VESSEL** lies E.  $\frac{3}{4}$  S., 9 miles from the N.W. light-ship, with Formby and Crosby light-vessels in line bearing S.E.  $\frac{3}{4}$  E., the former distant 3 $\frac{4}{10}$  miles; Hoylake upper lighthouse, South, 9 $\frac{1}{2}$  miles; and Crosby lighthouse, S.E. by E.  $\frac{1}{8}$  E., 8 $\frac{1}{8}$  miles. The vessel is painted red, with "Bar" on her stern, and she carries one *fixed white* light, at a height of 30 feet above the water, and visible at the distance of 8 miles.

**Fog Signal.**—During foggy weather, a steam horn is sounded giving *three blasts a minute*, which may be heard at the distance of 3 or 4 miles; but should the horn not be ready for use a bell is sounded.

**FORMBY LIGHT-VESSEL** is moored in 50 feet, 1 $\frac{3}{4}$  mile within the outer edge of the bar of Queen channel; with Crosby lighthouse, open to the northward of Crosby beacon, bearing S.E. by E.  $\frac{3}{4}$  E. She is painted black, with "Formby" on her stern, has two masts with a black ball at the foremast head, and exhibits a *revolving red* light at an elevation of 30 feet, visible at the distance of 11 miles in clear weather. Formby light-vessel is S.E.  $\frac{3}{4}$  E., 3 $\frac{4}{10}$  miles from the Bar light-vessel, and from her, Crosby light-vessel bears S.E.  $\frac{3}{4}$  E., 2 $\frac{3}{4}$  miles.

**Fog Signal.**—During thick or foggy weather, a powerful fog horn gives *four blasts each of two seconds* duration, within a period of *fifteen seconds*, followed by silence for *forty-five seconds*, when the short blasts, followed by the same interval of silence, are again repeated. In the event of a fog coming on so suddenly that the horn cannot be brought immediately into use, or in case of the horn being disabled, a bell will be sounded.

**CROSBY LIGHT-VESSEL**, moored abreast the north-east elbow of great Burbo bank, and at the turn of Crosby channel, in 30 feet, constitutes the fairway beacon to and from the Mersey through Crosby channel. This vessel is painted red, with "Crosby" on her stern, and has two masts with a red ball at the foremast head; she carries one *fixed white* light at the main-mast head, 29 feet above the water, which is visible at the distance of 8 miles in clear weather; also, for the purpose of inward-bound vessels distinguishing her from Crosby lighthouse she carries two subsidiary *white* lights, one forward and the other aft, 9 feet above the water, so that when broadside on the lights will appear in the form of a triangle; but when seen end-on two lights only will show.

**Fog Signal.**—During fog a steam horn is sounded giving *three blasts a minute*, and will be heard between three and four miles off; if the horn is not ready for use a bell is substituted. From this light-vessel the channel course up to abreast Rock lighthouse is S. by E.  $\frac{3}{4}$  E., 5 miles.

**SANDS and BUOYAGE.**—The general rule adopted in buoying the several channels is such that, coming upon a buoy in the night the seaman may know by its shape on which side of the channel it is situated. An uniform system with respect to colour is likewise maintained as far as circumstances will allow. Thus, when inward bound, *can* buoys are to be left on the starboard hand, and *nun*, or conical buoys, on the port hand; the *can* buoys are painted *red*, and *nun* buoys *black*; buoys situated upon a projecting elbow of a bank, or at a turning point in the channel, are distinguished by a *perch and ball*. On the buoys of every channel are painted the initial letter of the channel, with a number, the numerals being arranged in consecutive order, reckoning from seaward; thus a *can* buoy, marked Q. 1, or a *nun* buoy Q. 1, denotes, respectively, the outer buoy on either side of Queen channel, the next buoys inward being marked Q. 2, and so on for other channels. Fairway buoys bear the initial letter of their channel, and "Fy.," and have distinct characteristics of form and colour.

The numerous sands which encumber the entrance of the Mersey will be better understood by a reference to the chart than by reading the most elaborate description, in fact any attempt to convey by words correct ideas of the extent and form of these banks and the intricate channels between them would be useless; it must therefore suffice to mention them in general terms.

**EAST HOYLE BANK.**—East Hoyle bank, as forming the east side of Helbre swash, has been partly described on page 126. The bank is of a triangular form, extending 4 miles from the shore in a north-westerly direction, and is 3 miles wide at the base, the latter, lying parallel to and

nearly connecting with the main shore from Helbre islets to abreast Dove beacons, forming one side of the narrow and shallow creek named Hoylake. The whole of the bank is dry at low-water, and rises with some degree of regularity from all sides towards the summit, which is from 10 to 23 feet above low-water springs.

**Buoys.**—Off the north-west end of the East Hoyle, and N.  $\frac{1}{2}$  E.  $1\frac{3}{10}$  mile from Helbre fairway pillar buoy, is a bell beacon to mark the fairway of Horse channel; it is moored in about 7 fathoms upon the following bearings:—Crosby lighthouse, E.  $\frac{1}{8}$  N.; Bidston lighthouse its apparent breadth open north-east of Leasowe lighthouse, S.E.; H. 1 red buoy, S.S.E.  $\frac{7}{8}$  E.,  $1\frac{7}{10}$  mile; Bar light-vessel, N.N.E.  $\frac{1}{2}$  E.,  $4\frac{9}{10}$  miles; and Newcome black buoy, E.  $\frac{1}{2}$  S.,  $2\frac{1}{10}$  miles. The bank is marked at its outer end and along its north-east side by *red* can buoys, bearing the letter H. and numbered from 1 to 5, No. 1 having a perch; and along its west side by four *black* nun buoys, H.E. 1 to H.E. 4, already described. The inner or Hoylake side of the sand is marked by two *red* can buoys, L. 1 and L. 2.

**Mockbeggar Wharf** is a shelf or flat of sand fronting the shore from Dove beacons to Rock lighthouse, and having an average breadth of about half a mile. It is marked by two *red* can buoys, R. 1 and R. 2; the first is placed off Dove spit on the line of Dove beacons; the second is two-thirds of a mile E. by S. from No. 1.

**Newcome Knoll** is a detached bank, with 16 to 19 feet upon it at low-water, its western end in 3 fathoms being  $2\frac{1}{10}$  miles N.E.  $\frac{1}{2}$  E. from the northern end of East Hoyle bank, from whence it trends E. by N. and then S.E.  $\frac{1}{2}$  E. for upwards of a mile; a *black* nun buoy, K., near its outer end, is S.E. by E.  $10\frac{1}{4}$  miles from the N.W. light-ship, and S.  $\frac{1}{3}$  W.  $4\frac{4}{10}$  miles from the Bar light-vessel. A depth of four fathoms will be found at three-quarters of a mile westward of the buoy.

**Six and Four-foot Flats**, extending north-westerly from the North spit, bounds Horse channel to the eastward; a *black* nun buoy with perch, H. 1, lies at their outer elbow.

**North Spit, North Bank, and Brazil Bank**, all in connection with Great Burbo bank, form together the north side of Rock channel, and extend in a direction conforming somewhat to Mockbeggar wharf, on the opposite side of the channel. North spit dries 4 feet, North bank 15 feet, and Brazil bank 10 feet, above low-water springs. They are marked by H. 2 *black* nun buoy, and by nine *black* buoys, R. 1 to R. 9; No. 1 buoy, lying near the south-west extreme of the North or Spenser spit, at the junction of Horse and Rock channels, is a bell beacon, and No. 9 buoy, at the south-east extremity of Brazil bank, where Rock

channel unites with the main stream of the Mersey, is distinguished by a perch.

**Deposit Buoy.**—A *red* and *white* horizontally striped can buoy, with perch and ball, lies one mile northward of the west end of North bank, with Bidston mill and Leasowe castle in line; it marks the place where dredged material, &c. is deposited.

**GREAT BURBO BANK**, the largest of all the sands at the entrance of the Mersey, dries at low-water over a space 5 miles long by  $2\frac{1}{2}$  miles wide. It extends to Rock channel, and it also forms the western and south-western boundaries of Crosby channel. Until lately it formed the southern boundary of Victoria channel, but that channel having nearly filled up, Little Burbo bank may now be considered as connected to the larger bank. Several swashways run through the bank in an easterly and westerly direction, breaking it up into distinct portions, and rendering its edges very irregular. These swashways being subject to frequent change are not used by vessels.

The highest part of the bank, situated about one mile within its south-east extreme, dries 20 feet at low-water; one mile within its north extreme it dries 10 feet, and between these positions its surface is very irregular; rising occasionally to 15 and 17 feet above, and falling to 6 feet (in the swashways) below low-water.

The buoys marking this bank are described on pages 158–9.

Great Burbo bank shelves out shallow to the westward, and is there called North Burbo flats; and an extensive spit, named Four and Three-fathoms tongue, projecting upwards of four miles in a westerly direction, is also connected with it.

**Little Burbo Bank**, since the silting up of Victoria channel, may be regarded as merely a north-westerly continuation of Great Burbo bank. It is upwards of 2 miles long, north-west and south-east, and nearly half a mile wide; having over it a general depth of 3 feet at low-water, except near its south-east end, where it dries 4 feet at that period of tide.

The north-west spit of Little Burbo bank forms the southern boundary of Queen channel bar passage; and is marked by a *red* can buoy Q. 2, with perch and ball, in 9 feet at low-water. Besides this buoy the shoal is well marked by six *red* can buoys, Q. 1, and Q. 3 to Q. 7.

**Victoria Buoy**, formerly the fairway buoy of Victoria channel, still remains in its position, although the channel of that name no longer existing, its other buoys have been removed. This buoy is a *black* nun, with a perch; it lies in about 3 fathoms, E. by S.  $\frac{3}{4}$  S.,  $9\frac{1}{2}$  miles from the N.W. light-ship; and S. by E.  $\frac{1}{4}$  E.,  $1\frac{9}{10}$  mile from the Bar light-vessel.

**Zebra Flats, Jordan Flats, and Taylor Bank**, extending from abreast the Little Burbo to abreast Crosby light-vessel, off the elbow



[illegible]

Jordan Bank.—A sandy spit separating the two salt-laked ponds from Jordan Bank, which is more to the eastward and rises to 15 feet. The east side, forming the west boundary of Spring Channel, is marked by  $S_1$  and east of  $S_1$  is  $S_2$ , the last having a point and being  $N. 10. N. \times S. \frac{1}{2} N. E.$  from Corner Spring Channel.

**Formby Spit, Mad-wharf, and Formby Bank** are portions of an extensive sandy flat which projects from Formby point to ancient Crosby point from whence it continues as a broad and regular shelf up to Liverpool docks. Formby spit extends  $2\frac{1}{2}$  miles N.W.  $\frac{1}{2}$  W. from Formby N.W. mark, and bounds the north-east side of Formby channel, at the entrance of which are two buoys; a black nun buoy, F. 1, also lies at the south part of Formby spit, and another black nun buoy, F. 2, lies at the northern extreme of Formby bank, and serves, with the red can perch buoy, F. 3, at the south end of Jordan bank, to mark the narrow swashway which connects Formby pool with Crosby channel. South of this swashway the flat shore, forming the east side of Crosby channel, is marked by five black nun buoys, C. 5 to C. 9. The buoys at the entrance of Formby channel, above-mentioned, are, Formby N.W. buoy, a black nun, lying E.  $\frac{1}{4}$  S., 12 $\frac{1}{2}$  miles from the N.W. light-ship, and with Formby N.W. sea-marks in line, bearing S.E. by E.  $\frac{3}{4}$  E.; the second or inner buoy, called the Fairway, lies one mile farther in upon the same line of marks; it is a chequered black and white nun buoy, marked F. Fr., and from it F. 1 red can buoy bears S.E. southerly,  $\frac{5}{8}$  of a mile.

The foregoing are the principal sands encumbering the entrance to the Mersey; having passed Rock lighthouse, the channel upwards is free of shoals to the anchorage off Liverpool, its eastern boundary being the walls of the various docks, and the western boundary the flat foreshore, and Birkenhead docks. The low-water breadth of the river decreases gradually from seven-tenths of a mile abreast New Brighton to four-tenths of a mile at Seacombe ferry.

**TIDES.**—By the Admiralty tide tables it is high-water, full and change, at Formby point, at 10h. 35m.; springs rise 24 feet, neaps 19 feet. Liverpool, 11h. 23m.; springs rise 27½ feet, neaps 20½ feet. The datum is 8½ feet below the Old dock sill.

By local tide tables and charts, at Liverpool, equinoctial springs are given at 33 feet, ordinary springs 30 feet, and neaps 23 feet. At Helbre, equinoctial springs 32 feet, ordinary springs 29 feet, neaps 22 feet. And on the charts published both by the Admiralty and Mersey Docks Board, the soundings are reduced to a low-water datum, 10 feet below the Old dock sill, or two feet below the level of a mean spring low-water.

At neap tides the time of high-water in the river and bay is nearly simultaneous; at any intermediate period, the precession of tide in the bay is proportioned to the number of days before or after spring tides. During spring tides the ingoing stream in the river continues for half an hour after the water has ceased to rise, and the outgoing stream for the same period after it has ceased to fall; but this interval becomes gradually less towards neap tides, when the turn of the stream and rise and fall of the tide nearly coincide. This continuance of the stream can be usefully depended upon only in the river, or in the deep channels immediately connected therewith, as in the bay the conclusion of each tide is marked by various deflections of stream, to which neither the term ingoing or outgoing strictly applies. Speaking in general terms, the stream in the bay may be described as setting toward the Mersey with the flood, and from it with the ebb, noticing that at the earlier part of the flood and latter part of ebb it sets into and from the several channels through the banks; but when the banks are covered, it sets over them from all parts of the bay in lines of direction converging towards the river entrance at Rock lighthouse.

The direction of the set of tide towards and from the N.W. light-ship is, with the flood, towards Rock lighthouse, and, with the ebb, in the opposite direction throughout each tide.

Both streams turn when the water ceases to rise or fall, which occurs three-quarters of an hour earlier than at the Old dock at Liverpool. There being no difference in the velocity of flood and ebb, the following table will show the usual rate of the stream in springs and neaps :—

Time.		Rate of springs.			Rate of neaps.
1st hour	- -	$\frac{3}{4}$ knot	- -		$1\frac{1}{4}$ knot.
2nd „	- -	$1\frac{1}{2}$ „	- -		1 „
3rd „	- -	$2\frac{3}{4}$ „	- -		$1\frac{1}{2}$ „
4th „	- -	2 „	- -		1 „
5th „	- -	1 „	- -		$\frac{1}{2}$ „
6th „	- -	$\frac{1}{2}$ „	- -		$\frac{1}{4}$ „

Hence it appears that the whole amount of the spring-tide drift in the vicinity of the light-ship does not exceed  $8\frac{1}{2}$  miles, and that of the neap drift  $5\frac{1}{2}$  miles. Therefore, if a vessel be becalmed near the light-ship about low-water, and the nearest shoal in the tide's course being the Six-feet flats at the back of the Burbo, which are 6 miles distant, it will be 4 hours flood, and there will be 24 feet rise of tide before she reaches the bank; but as by high-water she will have drifted on to Burbo bank, which dries up from 10 to 15 feet along her course, she will not have more than from 15 to 20 feet of water under her, and might be placed in a position of some hazard; but during neaps, by high-water a vessel would only have been drifted between the Newcome and the flats into 7 or 8 fathoms.\*

Near Newcome knoll, the flood stream sets south-east for the last 4 hours, and the ebb north-west for the first four hours, the rate not exceeding  $2\frac{3}{4}$  knots on springs, and  $1\frac{1}{2}$  knot on neaps.

About 2 miles north of Chester flats and West Hoyle spit, the set of the flood stream towards the bay occurs 20 minutes earlier and the ebb 30 minutes later than nearer the shore; the velocity at springs is  $3\frac{1}{2}$  knots, and at neaps  $1\frac{1}{2}$  knot.

One mile north of Formby N.W. buoy, the direction of the stream is towards and from the Ribble and not the Mersey; a vessel should therefore guard against this influence if bound for Liverpool, as with a westerly wind she would be hardly able to gain the entrance of Queen channel, and might have to anchor under unfavourable circumstances if drifting in a calm, or with a strong breeze, and heavy sea upon a lee shore.

It may be well to notice that, when navigating in the vicinity of the light-ships, it is necessary, in order to avoid collision, to be guarded against the effect of the current when it is setting towards them. From the sea channels, up to the river entrance, the rate of the current gradually increases from 2 and 3 knots an hour in the former, to 4 or 5 knots in the latter, and even attains, at equinoctial tides, a rate of 7 knots in the narrowest part of the river channel which is abreast the north end of Prince dock.

In the Appendix will be found a tide table for Liverpool bay, adapted to show the height of water above low-water level at any required period, and hence when the several channels may be entered, or the banks be crossed.

Liverpool, holding so important a maritime position, and in nearly a central situation with respect to the St. George channel or Irish sea,

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\* These observations refer to a former position of the light-ship N. by W. 3 miles from the present Horse channel Fairway buoy, they are now inserted in order to illustrate the effect of a tidal drift.

shipping of every class and nation direct their course towards it, bound either to its port in the Mersey, or to some neighbouring one for traffic or for shelter; too much publicity cannot consequently be given to any information which tends to relieve the difficulties and anxieties which at the best must always attend the navigation of so thronged a thoroughfare. In addition, therefore, to the remarks about the tides, which have only a local reference, we append the observations on the general influencing tides and currents, and some other useful notes from the concise and practically arranged work of the marine surveyor of the port of Liverpool, the former of which are founded upon the tidal laws discovered by the late Admiral Beechey.\*

"The St. George and Northern channels are well lighted on projecting headlands, at all principal harbours, and on the most dangerous of outlying shoals.† As the harbours are for the most part tidal harbours, suited only to small craft, and throughout these coasts there is a remarkable deficiency of harbours accessible at all times of tide; the seaman should be prepared in all weather to maintain his position at sea, and look for safety in good sea room rather than approach danger by nearing the land in search of a port of refuge."

"2. The Northern channel is the narrower, and being subject to tidal effects varying from perpetual slack water to currents of great strength, can be preferred to the southern route for sailing ships only when favoured by leading winds; in that part where the channel is narrowed by the projecting headlands of Galloway and Cantire, the rate of the current of the main stream, during spring tides, amounts to as much as five knots an hour, while strong inshore eddies tend in opposite directions. Between the Isle of Man and the coast of Ireland is found an area of perpetual slack water; more southerly, a system of currents prevails, taking directions intermediate between those of St. George and the Northern channel. A leading wind and good run through the Northern channel will bring the navigator, whether inward or outward bound, successively in contact with each of these various effects, in the course of 8 or 9 hours; and in a neighbourhood where lights exist in such close proximity to each other any misunderstanding of the allowance which ought to be made for the direction or strength of the stream, by altering the presumed position of the ship, is peculiarly liable to lead to mistakes in the identity of the lights. It would be easy to cite instances where such mistakes, attended with fatal consequences, have occurred; therefore, the distinctive characteristics of

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\* Navigation of the approaches to Liverpool, &c., by Staff Commander Graham H. Hills, R.N., Associate Inst. C.E., Marine Surveyor, Liverpool.

† See Admiralty list of lights in the British islands, published annually.

the lights and the tendency of the stream require great attention, and in order to avoid inshore eddies a strictly mid-channel course should be preserved, as the shore cannot be safely approached except with competent local knowledge.

"3. In St. George channel the currents, though requiring much consideration, are less complicated, and there being more working room the difficulties of navigation are generally less than in the Northern channel. After clearing at its entrance the outlying dangers of the Smalls and Tuskar the landfalls to be made consist mostly of bold promontories, discernible at long distances by day, and well lighted to warn by night of the dangers in their vicinity. Not only dangers are lighted, but about twenty-two years since a floating light, described in the list of lights, was moored in Cardigan bay in deep water, nearly midway between the Bishops and Bardsey island, intended as a fairway guide between those places, acting also as a warning against the danger of becoming embayed on the Welsh coast.

"The position of Cardigan bay light-vessel, in deep water, admits of her being approached from any direction without danger, consequently she affords a most useful mark as a point of departure for vessels working or contending with baffling winds.\*

"4. It is a remarkable fact that the majority of the disasters which have occurred to shipping, bound through St. George channel, have happened when with a fair wind the vessel has been on a supposed fairway course: this fact, at first startling, is clearly accounted for if the effects of currents are properly considered.

"5. Before stating these effects it is necessary that the subject should be cleared from misapprehension, which frequently arises from ascribing to tides and currents effects which are really due to errors, derived either from incorrect allowances for variation of the compass or for local deviation as applied to compass courses. Many charts issued by private chart-sellers fail to notice the fact that the variation of the compass, in these seas, is undergoing gradual change; the variation given in such charts is represented as it existed a few years back, and is in excess of that which ought now to be allowed. The westerly variation of the compass is decreasing at the rate of about nine minutes annually; and in the southern part of St. George channel, through the fairway up to Liverpool, may be taken for practical purposes, at the present time, at  $21^{\circ}$  W.; if nearing the Irish coast, towards Dublin bay, an increase of a degree will be found,

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\* Also, for the purpose of facilitating the navigation, and to indicate to vessels their position when they may be influenced by the indraught of Carnarvon bay, a second light-vessel has been placed off this coast between Bardsey island and South Stack, as described on page 70.

and in the Northern channel it increases to  $23^{\circ}$ .\* In iron ships the deviation of the compass requires consideration, in respect of the change which it often undergoes in the course of a voyage, especially in new ships. In applying the variation or the deviation in points and quarter points to the compass course a slight inaccuracy occurs whenever the number of degrees does not accord exactly with the points and quarter points of the compass. This inaccuracy may be so slight as not to be regarded when either variation or deviation is considered separately, yet may be found to claim consideration if taken together with other allowances. The possibility of error from any of the above causes should be impressed on the mind, whether derived from the chart by which the ship is navigated, from original error in the compass, from change in the magnetism of the ship, from local differences in variation of the compass, or from the reduction of degrees into points and quarter points of the compass; such errors may be in themselves insignificant, and often occur in such a manner as to counteract each other, yet if they happen all to tend one way become cumulative, and amount to a very large divergence from the presumed course; therefore, while it is possible that separately no allowance can practically be made for them it will be most wise to consider what may be their joint effect, so as clearly to discriminate what allowances are proper to be made on account of the compass, or what for the current.

"6. The main stream of the tidal current of St. George channel coincides nearly with the general trend of the channel, so that its effect upon a vessel making a mid-channel fairway course would be experienced only in its retarding or assisting the progress of the ship, but in any deviation from the actual direction of this course, or any departure from the mid-channel, other considerations of great importance arise; because instead of stemming the tide the stream meets the ship on the bow, and instead of being simply retarded in her course she is drifted to starboard or port as the case may be. As a consequence, instead of continuing to experience the effects of the fair mid-channel stream, she is brought toward the eastern or western shores of the channel, where the direction and force of the current differ from that of the main stream. It is obvious that a ship becoming involved in such dangers without due foresight on the part of the navigator, may, quite unconsciously to him, be placed in imminent peril. That such perils have generally arisen, as before stated, to vessels sailing with a fair wind, on a supposed fairway course, is because in such cases, if inward bound, the course is shaped from the Tuskar diagonally across the channel direct for Holyhead or the

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\* The magnetic variations above given are for 1883.

Skerries ; or, if outward bound, the course is similarly shaped from the Skerries for Tuskar. These diagonal courses necessarily involve a departure from the fairway course of the channel, and from the current of the main stream of the tide ; yet it has too often happened that a vessel so steering has been considered as stemming the current, whereas, by receiving the adverse tide on the bow, she has been sheered or drifted toward the Irish or the Welsh coasts, as the case may be ; but the fact has not been apprehended until actually involved in danger on the Irish banks, or embayed on the Welsh coast.

“7. When working against adverse winds, and standing across the stream toward the shore, the navigator naturally anticipates variations in the direction or strength of the current, and is on his guard against their effects. But it may happen, unsuspected, that a ship is really subject to these variations, even when heading on a supposed fairway course, if from a scant wind, from leeway, from a heavy head sea deadening her way, or from the effect of any of the cumulative errors before mentioned (paragraph 5), she has been thrown out of the actual fairway of the channel. Great care therefore is requisite, lest, with an apparently fair wind and course, vigilance be lulled by a false appearance of safety, only to be dispelled when found unexpectedly among the Arklow and Blackwater banks in one instance, or embayed in Cardigan or Carnarvon bay in the other.

“8. A very ready method of determining the direction of the current arises from the fact, that the *time of its change of direction* throughout these seas coincides so nearly with the *time of high and low water at Liverpool*, that for all practical purposes it may be taken to be simultaneous with those events. In St. George channel the northerly set corresponds to the rising tide, and the southerly set to the falling tide of that place ; the converse applies to the Northern channel, and the meeting of the currents of the two channels is marked by the area of perpetual slack water, which occupies the mid-channel between the Calf of Man and Dundrum bay. Table III., given at the end, is founded upon the coincidence of the turn of stream with high-water at Liverpool. By reference to it the average time of the turn of the stream may be found, nearly enough for practical purposes.

“9. This general rule must be taken as applicable only to the fairway of either channel, as in the embayments, near some islets, and round certain headlands, very considerable departures from the general rule are experienced ; by keeping in the fairway such irregularities are avoided, and ought not to be willingly encountered, except under the guidance of competent local experience. The narrowness of the Northern channel makes its navigation more liable to complexities from these causes than in St. George channel, where, over the breadth of its fairway, an equable

set of either flood or ebb current, for  $6\frac{1}{2}$  hours at a time, may be reckoned on. The rate of the current is slow at the earlier and latter part of each interval, attaining its greatest velocity about the end of the second hour of the tide, which it maintains till near the fifth hour; and then slacks; the rate during the greatest velocity varies from one knot an hour at neaps to 3 knots at springs, and amounts during the entire interval to a set of from 7 miles at neaps to 14 or 15 at spring tides; the set in opposite directions in two following periods is nearly equal at any fixed spot; but although equal at one spot, it will be necessary to consider the progressive motion of the ship, and what may have been the change of current during her transit from a former to her present position, and the actual relation of that position with regard to the fairway of the channel. For near the Tuskar the Smalls, the Bishops, Bardsey, South Stack, or Skerries, the rate increases from 3 miles in the offing to 6 miles near the shore; therefore a ship standing across the tide towards the land, or steering in shore with a bow tide, will have a set gradually increasing in rate and altering in direction, and even though she may have reached in from a position well ascertained by bearings or otherwise, frequent measures should be taken for verifying her course.

"10. Assuming that the route by the Northern channel would be adopted only with a leading wind, the question of soundings as relating to that channel is mentioned only for the purpose of reiterating the ever necessary caution against *neglect of the use of the lead*. For entering the channel with a leading wind, thick weather may ensue, contrary or baffling winds may arise, then true confidence can be based only on a practically acquired knowledge of the depths already traversed. The rates of current mentioned in paragraph 9 show that also in St. George channel a vessel may be set, in a very short time, from a safe position into imminent danger; therefore the necessity of attention to the lead is here also imperative. No general rule as to safe soundings can be given. The depth of 40 fathoms will be found in the immediate neighbourhood of the Tuskar, the Smalls, the Bishops, and Bardsey, and 30 fathoms close to the Arklow, Blackwater, and neighbouring banks; if, being near the latitudes of those places, such depths are ascertained, put the ship's head from the danger, and stand towards the fairway, preferring always to tack too soon rather than court the approach to possible danger. It will be seen by recent charts of the Irish sea, that the depth last named is in some parts in the very midst of danger, and if met with unexpectedly, the exercise of sound judgment would be required as to the proper course to be adopted.

"11. On charts the depths of water are given for the level of low-water spring tides: in ascertaining the true value of soundings the height of tide above that level should be borne in mind. It will often occur when in the



deeper water, from the circumstances under which soundings are taken, that the accuracy of the depth found cannot be depended upon to a fathom or so, more or less ; and because of this uncertainty it is apt to be thought that when the rise and fall of tide is small, as in the south-western part of St. George channel, that element is of little importance ; but the shoaling of the water to the extent of a fathom is sometimes a matter of great significance, and as from slack line the tendency of the lead is usually to give more than the actual depth, it will always help to a decision on the safe side to consider how much the apparent depth is further increased beyond that of the spring tide low-water level by the height of the tide at the time in question ; the two corrections for slack line and height of tide, though in themselves small, may amount together to something considerable. But when the water is shoaler, and the rise and fall of tide are greater, soundings taken without due consideration in this respect, and thus erroneously applied to verify the ship's position on the chart, may lead to most serious consequences.

" 12. In considering the actual rise and fall of tide in these seas, a stranger is liable to be thrown off his guard by the apparently reasonable assumption that the greatest rise and fall takes place where the greatest strength of current exists ; but such is not the case : in the area of perpetual slack water westward of the Isle of Man, the range of tide is as much as 18 feet, while in navigating between the Tuskar and Arklow light-vessel where the currents are strong, there will be experienced less rise and fall than in any other part of the course thence to Liverpool ; in fact, there is a position on the Irish coast between those points, where the range of tide is only from one foot to 2 feet.

" In rounding the Tuskar, at a distance of 3 to 5 miles, the rise and fall of tide ranges from 6 feet at neap tides, to 10 or 11 feet at springs ; across towards the Smalls and Bishops the range increases to 14 or 15 feet at eaps, and 18 or or 19 at springs, and nearly the same up to Holyhead.

" 13. The height of high-water over the spring tide low-water level calculated for every day in the year, for the ports of Waterford, Milford, Kingston, Holyhead, and Liverpool is given in the tide tables published annually by the Admiralty ; together with a table for ascertaining the level at any time between high and low-water at those places. These particulars are useful for reducing the depths taken on neighbouring coasts to the low-water level proper for comparison with the depths given on the chart. Having ascertained the spring-tide range of the locality, and the actual range of the tide for the day, by considering the state of tide at the time of sounding, a short mental calculation will deduce the corresponding sea level sufficiently near to guide to the probable amount of correction for rise of tide to be applied to the soundings, and to prompt to further attention to

the subject. Consider how much the state of the tide is above or below the half-tide of the day—if above, add that quantity to, if below, subtract it from, the half of the spring-tide range of the locality in question; the result will be the amount of actual sea level above the low-water level as given on charts, and to be applied as a minus correction to the actual soundings ascertained. Suppose an instance where the correction would be smallest:—

Near Tuskar the spring tides range 11 feet—	
half-range - - - - -	5½ feet
Within two or three days of neap tides. Range	
of the day 7 feet—half-range - - -	3½ feet.
Time of tide 1½ hour from low-water, estimated	
to be a foot above low-water of the day -	1 foot.
Sea level <i>below</i> half-tide range of the day, and	
therefore subtractive from the spring tide	
half-range - - - - -	2½ feet.

Correction to reduce soundings to low-water level	3 feet.
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To this amount of half a fathom add the effect of stray line, and from this example, taken near low-water time, where the rise and fall of tide is at the smallest, a quantity appears which will show how important it becomes that due consideration should be given to the same phenomena, when being further advanced in the channel the water becomes shoaler, and the range of tide, instead of being 7 feet, mounts up to 15, 20, and near Liverpool, even to 30 feet.

“14. It is necessary to observe, that times of high water given in tide tables, or as noted on charts, for the full and change of the moon, and which differ constantly in different localities, must be carefully distinguished from the time of the turn of stream before mentioned (paragraph 8). The latter event is nearly simultaneous throughout these seas, and happens to coincide with the times of high and low-water at Liverpool; hence Table III., showing the average state of the tide at Liverpool, calculated for every hour of the moon's transit over the meridian (given in page IV. of every month in the Nautical Almanac, in the column headed ‘Meridian Passage’), will show approximately the time of the change in the direction of the stream, the time of high-water at Liverpool denoting the commencement of the set to the southward, and the time of low-water the commencement of the set to the northward, in all parts of St. George channel, the converse applying to the Northern channel; while the corresponding levels show the change from springs to neaps, and point to a proportionate condition, according to the rise and fall belonging to each locality.

"15. It has been recommended that safety should be sought in good sea room rather than in harbours of refuge, but the condition of a ship may be such as to render it impossible to follow that precept. On approaching St. George channel with a disabled ship, before entering it there remains a choice of two harbours of refuge, viz., Waterford or Milford, the former a bar harbour, with only 12 feet at low-water springs, and requiring half-tide for a ship drawing 15 feet to enter, if any sea is running; the latter free from outlying dangers in its approaches, and accessible at all times of tide. After entering the channel no port of refuge is reached until in the neighbourhood of Kingstown or Holyhead, the former to be attained only by a proper regard for the Arklow, India, Codling, and Kish banks, the latter by far the most easy of access; the approach to it by day is clear of danger, by making due allowance for currents, and for the sailing condition of the ship, and by avoiding the land as you round into the bay, and then hauling round the north-east end of the new breakwater close to, but at sufficient distance to clear the works connected with it, when you may anchor in safety, or at least will be in a position where assistance can be rendered to the ship. At night, the end of the breakwater is shown by a red light, and provided the Skerries or South Stack light can be seen, and that in closing the bay care is taken to distinguish clearly the ship's position, the breakwater and features of the harbour having already been carefully studied, it may be entered without difficulty, anchoring as soon as possible after getting into smooth water, as the upper part of the harbour is often crowded with small craft; this is the only port for which it can be *advised* that a disabled ship should make.\* In desperate necessity and in hope of saving life in a sinking ship, the nearest beach would naturally be sought; yet in such urgent need, or in the event of a ship being entangled in certain vicinities, it may be useful to name Greenore bay, on the coast of Wexford, and St. Tudwall roads, on the coast of Carnarvon,† as capable, according to circumstances, of affording anchorage. A good seaworthy ship, if entangled in Carnarvon bay, or among the shoals lying to the north-westward of the Tuskar, would find it difficult in bad weather to contend with the strong currents that rush round Carnsore point, or through Bardsey sound, and in its vicinity; yet, in such or any more desperate case, by previous careful study of the coast, and present consideration of the capabilities of the ship, acceptable shelter might be found in those places."

**Pilots.**—The Liverpool pilots cruise in fore-and-aft schooner rigged vessels, each vessel having her number painted on the mainsail, foresail, and staysail, and also on each bow.

\* See page 84 of these directions.

† Page 63.

It is compulsory upon all ships entering Liverpool to take a pilot, and in the event of refusing one when offered, pilotage rates are nevertheless levied, and in cases where a ship cannot be boarded, a pilot boat leading in is reckoned as pilot service. Off point Lynus is the westernmost station appointed for the cruising of the Liverpool pilot boats; occasionally when driven by stress of weather they may be met with farther to the westward, and in strong easterly winds board their pilots in the shelter of Church bay to the southward of Carmel head. Two vessels are usually on the westernmost station. They are easily distinguished from other vessels, their sides being painted from the gunwale down with a yellow, green, and yellow streak, [black bends, and white to the water-line, and by their rig, fore-and-aft schooner; so long as any pilots remain unboarded, they carry a large flag at the main-topmast head, the upper half white and lower red, and at night are recognised by a single bright masthead light, with an occasional flash torch. Between this station and Liverpool bay four other boats are stationed, so that should this station be passed without receiving a pilot, a course may be shaped for the N.W. light-ship, constituting the fairway guide to the channels through the extensive shoals of Liverpool bay, and if the signal for a pilot be kept flying, it can rarely happen that the N.W. light-ship will be reached without the vessel being boarded.

A pilot boat is always in attendance seaward of the entrance of the various channels for the purpose of receiving pilots from outward-bound ships, and her attention should be attracted by showing the usual pilot signal.

Every ship while in charge of a pilot shall keep continually hoisted a distinguishing flag with which each pilot is provided; and, at night, should she be chased by a pilot-boat, the fact that she has a pilot on board should be signified by hoisting a light, which light must be lowered and rehoisted every five minutes, as long as the ship continues to be chased.

Pilots in charge of ships are responsible that they carry by night the proper regulated lights, as well for ships under way as for ships at anchor.\*

Pilots are instructed to cause the ensigns of all ships to be hoisted on entering the port. Masters of British ships are responsible for having proper ensigns, except under the special authority of the Admiralty. The only proper ensign is the red ensign with the union jack in the upper canton. Any departure from this renders the master liable, on the pro-

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\* See official rules in the Appendix, page 282.

secution of the informant, to a penalty not exceeding 500*l*. It is sometimes erroneously supposed that by adding a border to other ensigns, and thus varying them from those used by Her Majesty's ships, the penalty is evaded, but such is not the case, as the wording of the law is precise that none other than red ensigns shall be worn, and that the use of any ensign or pendant resembling or *appearing to resemble* those appropriated to Her Majesty's ships shall render the master and owner liable to prosecution.

Pilots in charge of ships outward bound are required to conduct them, according to the channel they take, either to the N.W. buoy of Horse channel, the Bar light-vessel, or Formby N.W. buoy, and in case of a pilot quitting the ship against the master's consent and without fulfilling this obligation, all pilotage money which otherwise would have been due becomes forfeited.

The pilot service of the port of Liverpool is under the control of the Mersey Docks and Harbour Board.

Complaints and reports of alleged misconduct on the part of the pilots must be made in writing, signed by the complaining party, and sent to the superintendent of pilotage, or left at the office, south side of Princes dock.

There is a large fleet of steam-tugs, about 100 in number, to be distinguished only by being paddle-wheel, and an uniform rig of one mast.

**Life-Boats** are maintained at various parts of the coast bounding the entrance of the Mersey; namely, at the point of Air, two; at Helbre island, one; at Hoylake, one; at Formby point, one; and at the Princes stage, Liverpool, two. Besides which, the Royal National Life-Boat Institution has a station with two boats, one of which is tubular, at New Brighton; there are also belts and lines at Hoylake and Waterloo. The boats have all been placed since 1840, and are manned by picked fishermen residing near the several stations. All masters and others in charge of vessels entering or quitting the port of Liverpool, requiring the assistance of life-boats belonging to the Dock trustees, either for the preservation of life or other purposes, are requested to hoist the distress signal, in order that the boats may be dispatched as soon as possible.

From the foregoing description it will be understood that the lights, buoys, and beacons, for the navigation of the Mersey are so complete that any intelligent seaman if overtaken by a gale, and unable to procure a pilot, may run for whichever channel appears most eligible, provided the marks can be discerned, but thick weather is very prevalent in Liverpool bay, especially during westerly winds, and the smoke of the town effectually obscures objects with off-shore winds. The caution, therefore, naturally

presents itself that the port should never be attempted without a pilot, except in cases of emergency, when vigilance and a careful attention to the following directions would be absolutely necessary.

**HORSE and ROCK CHANNELS** conduct by one long bending reach into the Mersey, which channels, passing between East Hoyle bank and Mockbeggar wharf on one side, and the Six-and-Four feet flats, North spit, and North and Brazil banks on the other side, lead from the Fairway bell beacon buoy to Rock lighthouse. Horse channel begins at the bell beacon, which is S.E.  $\frac{1}{2}$  E.,  $8\frac{1}{2}$  miles from the N.W. light-ship, and extends to the North spit, or to the line of Hoylake lighthouses in one; its whole length being  $4\frac{1}{2}$  miles. Advancing inwards from the fairway to between East Hoyle bank and the eastern flats, the depths are from 7\* to 5 and 4 fathoms, the latter depth occurring at the narrowest part of the channel, which is near the *black* perch buoy that marks the elbow of the Six and-Four feet flats, where it is a quarter of a mile wide; it afterwards maintains an average breadth between the 9 feet lines of about 3 cables nearly up to Spencer bell buoy, but the depths are only from  $3\frac{1}{2}$  to 5 fathoms in the centre. The steep edge of the East Hoyle is marked by five *red* can buoys H. 1 to H. 5, the outer, or No. 1, carrying a perch and ball.

Rock channel, as the inner portion of the reach is called, is bounded by the flat from the main on the south side, which dries out three-quarters of a mile at Dove spit on the east side of the entrance to Hoylake, and abreast Leasowe castle and Wallasey sand-hills for about half a mile. Two *red* can buoys, R. 1 and R. 2, mark the southern side of the channel; and one *black* bell beacon and eight *black* nun buoys, R. 1 to R. 9, which last carries a perch and ball, mark its northern side. The general direction of the channel is about E.  $\frac{1}{4}$  N.; it is rather more than a quarter of a mile wide at Dove spit, and continues with nearly the same width to the *black* buoy R. 3, with a central depth of from 4 to  $1\frac{1}{2}$  fathoms. It then becomes rapidly contracted, and at Rock gut, where the bank approaches to within half a cable of the flat from the main, it is very tortuous, and there is not more than 2 or 3 feet at low-water for nearly a mile.

**Tidal Streams.**—In Horse and Rock channels the first half of the flood and last half of the ebb set fairly in and out, but after half-flood, and before half-ebb, when the banks are covered, the tides set obliquely across North spit, in a direction towards and from Rock lighthouse.

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\* These and other described depths in Liverpool bay are as shown on the Admiralty chart, No. 1,951, where the soundings are reduced to a range of 80 feet of tide, or two feet below the level of low-water of ordinary springs.



**DIRECTIONS, by Day.**—Being near the N.W. light-ship, and having the land objects distinct, run in for the Fairway bell beacon, \* and onward from thence with Bidston lighthouse open its apparent breadth to the north-eastward of Leasowe lighthouse, bearing S.E. easterly; passing to the north-eastward of the three *red* buoys H. 1 (with a perch), H. 2, and H. 3, and at the distance of nearly one cable from the two latter. When Hoylake lower lighthouse has been brought to bear S.  $\frac{3}{4}$  E., or when the vessel is between the *red* can buoy H. 3 and the black perch buoy of the flats, haul promptly to the southward and steer towards the lower lighthouse on that bearing, until Bidston lighthouse appears twice its breadth open to the south-westward of Leasowe lighthouse, S.E.  $\frac{5}{8}$  E.; then steer on a direct line for Bidston lighthouse until Hoylake lighthouses are in line, bearing S.S.W.  $\frac{2}{3}$  W., when the vessel will be in a position about  $3\frac{1}{2}$  cables south-eastward of Spencer bell buoy.

It is to be regretted that Horse channel has become tortuous from the continued increase of the elbow of the East Hoyle to the eastward, and of the Six-and-Four feet flats to the westward, so that the lights which were placed to lead in a direct course through, will no longer answer that purpose.

To vessels working in, Newcome knoll is in the approach to Horse channel; those of moderate draft may pass close to the westward of the buoy, but the lead would not give sufficient warning on its north side to heavy vessels. Kirby church, well open to the westward of Hoylake hotel, bearing S.  $\frac{1}{4}$  E., leads two cables to the westward of the buoy in  $3\frac{1}{2}$  fathoms at low-water; and Bidston lighthouse, in line with Leasowe castle, S.S.E.  $\frac{1}{2}$  E., leads midway between the knoll and Burbo flats, in 4 fathoms, and outside the general trend of the flats.

Entering Rock channel, and being  $3\frac{1}{2}$  cables to the south-east of Spencer bell buoy, with Hoylake lighthouses in line bearing S.S.W.  $\frac{2}{3}$  W., steer E.  $\frac{3}{4}$  S. for half a mile, or to near R. 2 *black* buoy, when Bidston lighthouse will again be open its own breadth to the north-eastward of Leasowe lighthouse, S.E. easterly, and the chimney of Bootle waterworks (which is generally smoking) will be in line with the south side of Rock fort, bearing about E.  $\frac{1}{2}$  S.; from this position steer about E.  $\frac{1}{4}$  N., for nearly  $3\frac{1}{2}$  miles, passing half a cable to the southward of the *black* buoys numbered 2 to 7; to the eastward of the latter buoy Rock gut commences.

In scant winds, and with the weather too hazy to admit of the marks being distinctly seen, the lead will give due warning when standing towards the Six-and-Four feet flats, but it must not be trusted on the other side when approaching the steep edge of East Hoyle bank. In Rock channel,

also, the way may be safely felt by the lead along the southern flat, but it is of little avail when standing towards the abrupt edge of the northern banks.

A vessel having arrived above Leasowe light, and the tide not having flowed enough to allow of her passing through Rock gut into the Mersey, may anchor in Leasowe hole just to the south-west of *black* buoy R. 3, where there is 13 feet at low-water, or she may go farther in to Wallasey hole, which is between the *black* buoys, R. 4 and R. 6, where the depth is from 18 to 20 feet at low-water, but the available width is little more than one cable. Not many years ago the largest ships belonging to Liverpool could proceed to sea from these roadsteads at low-water, but now vessels drawing 16 feet cannot proceed outwards from them before first-quarter flood.

Rock Gut is, as before observed, narrow, and great caution is necessary in using it, lest in avoiding the steep edge of Brazil bank, the vessel approach the southern flat too closely, and trail upon the ridge of shingle which stretches from Rock lighthouse paralld to the shore for fully a mile to the westward. It is also necessary in rounding Rock lighthouse to beware of the rocky ledge which projects from it for a cable to the north-eastward, and also of the steep sandy elbow within it, named the Ripraps, which is marked by *red* buoy, C. 9.

It has been mentioned in the description of Rock lighthouse that a *black* ball hoisted by the side of the lantern denotes a depth of 11 feet through Rock gut, and that the same depth at night is indicated by a *fixed white* light from the lower chamber of the lighthouse. At half-tide, a depth of 15 feet will generally be found in the passage.

Being in a position in Wallasey hole, about midway between the *black* buoys, R. 5 and R. 6, continue the course about E.  $\frac{1}{4}$  N., until about one cable beyond R. 7 buoy, when steer for Bootle chimney, E. by S.  $\frac{1}{4}$  S., which will then be a little south of the *black* perch buoy, R. 9, pass close to the southward of *black* buoy, R. 8, and when about one cable farther steer more southerly, remembering the caution above given in rounding Rock lighthouse, and the sandy elbow marked by C. 9 *red* can buoy, abreast which the water quickly deepens to 7 and 8 fathoms in the main channel of the Mersey.

**Anchorage.**—The anchorage to be taken up must depend on the vessel's destination. If bound to the docks, she should anchor as soon as possible after the Ripraps, or C. 9 *red* buoy, has been rounded, between Egremont and New Brighton, in about mid-channel off a sandy shelf, which is much resorted to as an anchorage and beaching ground for small



craft; but if intending to proceed to Sloyne road,\* or the Quarantine ground, the chart will be the best guide. It must, however, always be borne in mind in reference to anchorage that, abreast Rock lighthouse, the stream at springs runs at the rate of 4 knots, and in Sloyne road rather more than 5 knots, per hour. A good scope of cable should be given, and a second anchor be ready for letting go, care being taken to sheer clear of the anchor when swinging; and at night to exhibit the proper anchorage lights.

**By Night.**—It would be the height of rashness in a stranger to attempt Horse and Rock channels by night without a pilot, unless under circumstances that would admit of no alternative; in which case, the following directions will avail the intelligent seaman, provided he can depend on the steerage of his vessel.

The first step to be taken will be to endeavour to identify with certainty the various beacon lights; for there are many other lights in and about Liverpool, as well as from the smelting furnaces about the Dee, which tend to perplex the seaman. This point having been established, and the position of his vessel determined, he should then inform himself as to the actual state of the tide and depth in the channels by a reference to the table in the Appendix, so that he may be able to verify his position at each cast of the lead.

Proceeding thus cautiously, close the N.W. light-ship, and steer from her to the Fairway bell beacon, S.E.  $\frac{1}{2}$  E., allowing for tidal set, until Bidston light is about one degree to the left or north-eastward of Leasowe light, bearing S.E. easterly, in order to clear the elbow of the East Hoyle.† Hoylelake upper light will first appear on a S. by E.  $\frac{3}{4}$  E. bearing, when the vessel has arrived abreast H. 1 red perch buoy marking the spit of East Hoyle, but the S.E. easterly course must be continued until Hoylelake lower light appears bearing S.  $\frac{3}{8}$  E., when the vessel's head must immediately be turned towards that light, so as to avoid the Six-feet flats. Bidston light will speedily close with and cross that of Leasowe, and must be opened a degree and a half to the south-westward of it on a S.E.  $\frac{5}{8}$  E. bearing, in order to give a sufficient berth to the flats. Now steer towards Bidston light, keeping it

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\* The question has been discussed as to the necessity of guarding against accident to the numerous passengers that cross to and fro between Liverpool and Birkenhead in the ferry steamers by interdicting anchorage in this part of the river which includes the track of the Woodside boats; and the pilots are under instructions to refrain from using the same for anchorage, whenever the prudent management of the ship will permit.

† The southern limit of visibility of the red sector of the light at Great Orme head is about 3 cables to southward of Horse channel Fairway bell beacon.

and Leasowe light in the same relative positions, until Hoylake lights have been brought in line, S.S.W.  $\frac{2}{3}$  W., when, if before half-flood, the vessel may safely anchor till a pilot be obtained; but if at a later period of the tide, she may proceed into Rock channel, and take up a berth more protected from the swell.

If desirous of proceeding on, instead of taking up an anchorage, when North Docks Wall fixed light and Rock light appear in line, bearing E.  $\frac{1}{4}$  S., and Hoylake lights are also in line, alter course to E.  $\frac{3}{4}$  S., with Rock light a little on the port bow, for half a mile, when Bidston light will again be open to the north-eastward of Leasowe light, bearing S.E. easterly, then steer about E.  $\frac{1}{4}$  N. On this track Leasowe light will disappear on a S.S.E. bearing, about three-quarters of a mile farther on, and Bidston light will in like manner become obscured when bearing S.S.E.  $\frac{1}{4}$  E.; the vessel will then be two cables to the westward of No. 4 *black* buoy, and, if dependence can be placed on her answering her helm quickly, the surrounding objects be tolerably distinct, and the seaman has sufficient confidence in himself, he must continue on the same course, about E.  $\frac{1}{4}$  N. for  $2\frac{1}{4}$  miles, and, having passed a cable to the eastward of No. 7 *black* buoy, the course must be altered to E. by S.  $\frac{1}{4}$  S. for the North Docks Wall *fixed white* light, so as to pass to the southward of Nos. 8 and 9 *black* buoys, and two cables to the northward of Rock light. Shoot well into the stream of the Mersey and then heading South for a convenient berth, anchor with Rock light bearing about N.N.W., in 10 fathoms. It must, however, be remembered that the holding-ground is treacherous, and that there is a weighty and rapid tide towards and during springs.

Should it blow so hard from the northward in the morning as to render the berth unsafe, and to prevent a pilot getting on board, it will be prudent to slip, that is, if it be not practicable to wait for low-water to weigh, and run up to the sheltered anchorage and excellent holding-ground of Sloyne road, one-third of a mile S.  $\frac{1}{2}$  E. from Birkenhead ferry.

**HOYLAKE or HOYLELAKE**, once a roadstead of great resort, where William III. landed in 1690, and latterly used by pilot boats and small coasters, is now only available at high-water as an anchorage for a few fishing craft, or as a good refuge for vessels having parted their anchors; being but a narrow gut, with a low-water depth of 7 feet a little west of L. 1 *red* buoy, to 3 feet off the church, and the former entrance from the westward is entirely closed up.

At the eastern end of the lake, on the south-eastern elbow of the East Hoyle, and nearly on the line of Dove beacons, is Jackson's buoy, a *red* can marked L. 1, and another *red* can buoy, L. 2, is on the southern edge of East Hoyle bank, half a mile from buoy L. 1.

**Directions.**—The eastern entrance to Hoylake has a depth of 7 feet at two hours' flood. To enter it from Horse or Rock channel great care is necessary to guard against running on the high part of Dove spit, which is very dangerous; leave R. 1 *red* can buoy on the port hand, and keeping the northern Dove beacon just open to the eastward of the southern one, steer for the easternmost of the Hoylake buoys, L. 1, leave it close upon the starboard hand, and, if intending to beach, steer along shore for half a mile to the next *red* buoy, L. 2, and the farther the vessel can reach towards Hoylake lower light the smoother will be the water.

**QUEEN and CROSBY CHANNELS.**—Up to a recent period, Victoria channel was a principal passage into the Mersey both by day and night, but it has closed up, the buoys have been removed with the exception of the fairway buoy, which is now designated "Victoria," and Formby light-vessel has been shifted from her old position, and established as a night mark for leading through Queen channel, thus rendering the latter the only safe night channel, whilst it is at the same time the best day passage under most conditions of wind and weather.

Queen channel is between Little Burbo bank to the south-westward and Zebra and Jordan flats to the north-eastward; and at its entrance, the bar connecting the outer portions of these dangers, has an average depth of 8 feet\* over it at low-water. This bar is about one-fifth of a mile across, and the passage over and within it to beyond Formby light-vessel is marked by seven *red* can buoys upon the south-western side, and by four *black* nun buoys on the north-eastern side, as already described. The two outer buoys, which are two-thirds of a mile apart, and mark the width of the passage over the bar, bear, respectively, S.E.  $\frac{1}{2}$  E.  $1\frac{1}{2}$  mile, and E. by S.  $\frac{1}{2}$  S.  $1\frac{3}{10}$  mile from the Bar light-vessel; while Formby light-vessel is  $2\frac{1}{10}$  miles from Q. 1 *black* buoy.

Queen channel ends, and the lower reach of Crosby channel begins, above Formby light-vessel, which is moored in 50 feet at low-water; from her, Crosby lighthouse is open to the northward of Crosby beacon, bearing S.E. by E.  $\frac{3}{4}$  E.; Crosby light-vessel is S.E.  $\frac{3}{4}$  E.,  $2\frac{2}{3}$  miles; the *black* buoy C. 1, E.  $\frac{1}{2}$  N., half a mile; and the *red* buoy C. 1, S.E.  $\frac{1}{4}$  S.,  $1\frac{1}{2}$  mile. The lower reach of Crosby channel is marked by two *red* can buoys on the south-west side, and by four *black* nun buoys on the north-east side. This portion of the channel is direct, with depths of 4 to 8 fathoms in it at low-water, and at its narrowest part, which is abreast the elbow of the Great Burbo, the width is nearly half a mile.

Crosby light-vessel, moored at the south-east bend of Crosby channel, opposite the north-eastern elbow of Great Burbo bank, is in 5 fathoms at

\* See foot note, page 153.

low-water, and lies with Rock lighthouse bearing S. by E., distant 5 miles; Crosby lighthouse, E.  $\frac{3}{4}$  S.,  $2\frac{2}{10}$  miles; the *black* nun buoy C. 5 at the south-west elbow of Formby bank, S.E.  $\frac{3}{4}$  E.,  $\frac{1}{10}$  mile; the *red* can buoy C. 4, on the edge of Great Burbo bank, S.  $\frac{1}{4}$  W.,  $\frac{3}{4}$  mile; and the pillar bell beacon C. No. 3, *red*, off Askew spit, S.W.  $\frac{3}{4}$  S.,  $3\frac{1}{2}$  cables. Within the light-vessel, Crosby channel which is direct to abreast Rock lighthouse, is marked on the western side by Askew spit pillar bell beacon (C. No. 3, *red*), and by the *red* can buoys C. 4 to C. 9, and also by the *black* nun with a perch, R. 9, at the outlet of Rock gut; and on the eastern side by the five *black* nun buoys C. 5 to C. 9. The least water in the sailing track through it is 23 feet at low-water springs, but the average depths are 5 to 7 fathoms, while it possesses a width of three-quarters of a mile except abreast Crosby point, where, for a short distance, the deep water passage becomes contracted to half a mile.

From the foregoing description it will be understood that in Queen and Crosby channels there are only two courses, namely, from the Bar light-vessel to Crosby light-vessel, S.E.  $\frac{3}{4}$  E., and, from the latter to abreast Rock lighthouse, S. by E.  $\frac{3}{4}$  E.

**DIRECTIONS.—By Day.**—It was remarked in the description of Great Burbo bank that an extensive tongue projects from it to the westward. Six fathoms upon the outer end of this tongue is S.W. by W.,  $3\frac{1}{4}$  miles from the Bar light-vessel, and S.E. by E.  $\frac{1}{4}$  E.,  $6\frac{1}{2}$  miles from the N.W. light-ship. The general low-water depth of this spit is  $3\frac{1}{2}$  and  $4\frac{1}{2}$  fathoms, with patches of 3 fathoms and under, three-quarters of a mile to southward of the Victoria buoy, causing, in strong westerly winds, during the ebb tide a short cross sea, which small vessels will do well to avoid. For this purpose, while approaching Queen channel, do not open Crosby lighthouse to the southward of Formby light-vessel, or bring either of these objects to the eastward of S.E. by E.  $\frac{3}{4}$  E. Should the weather be too hazy to admit of objects being discerned, then the soundings will prove an useful guide, for in the fairway the depths decrease from 8 to 6 fathoms, and the bottom is mud, whereas the tongue is of sand, with less depths over it.

Steam ships and vessels in tow, when navigating in the sea channels or approaches to the river Mersey between Rock lighthouse and the farthest point seawards to which such channels are buoyed on both sides, are required, whenever it is safe and practicable, to keep to that side of the channel which lies on the starboard side of such steam ships, &c.\*

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\* See Appendix, pages 281 and 282, Rules to be observed by steam ships, and vessels in tow, when navigating in the sea channels or approaches to the river Mersey; also, rules as to lights to be carried by vessels navigating, or anchored in, the river Mersey.

Having passed the Bar light-ship, care being observed in doing so to allow for tidal set, proceed towards the bar with Formby and Crosby light-vessels in line S.E.  $\frac{3}{4}$  E.; at the distance of one and three-quarters mile the ship will be between the two bar buoys Q. 1 *black* and Q. 1 *red*, and over the steep edge of the 8 feet bar; and when advanced to between the buoys Q. 2, the water will have deepened considerably. Formby light-vessel, which lies in 50 feet, must be passed to the southward. From the necessity of mooring this light-vessel with a long scope of chain, she makes a circuit of about 30 fathoms across in swinging, and though this fact is not of present importance, on account of the ample breadth of Queen channel at the bar, it should be kept in remembrance, in case of any future tendency towards a decrease of width.

Zebra flats, forming the north-eastern boundary of the bar, being very low, a vessel in scant easterly winds, without a pilot or steam-tug, may make free with it, instead of confining herself to short boards within the limits of Queen channel, that is, if the tide be near half-flood, or has flowed sufficiently for the required draught.

Bidston lighthouse, well open to the westward of Formby light-vessel, bearing S. by E., clears Jordan flats in 5 feet at low-water, and marks the limit to which a vessel may stand in crossing the flat into Queen channel, and toward Formby light-vessel. It must, however, be remembered that 3 feet less depth will be found in this track than in that over the bar of Queen channel.\*

From Formby light-vessel make good a S.E.  $\frac{3}{4}$  E. course for  $2\frac{2}{3}$  miles to Crosby light-vessel, passing her on either side as convenient, and then a S. by E.  $\frac{3}{4}$  E. course for 5 miles will lead to abreast Rock lighthouse and into the Mersey. Burbo bank, which dries from 10 to 20 feet above low-water springs, generally shows itself, but, in the event of it being covered, and the buoys not watching, an excellent leading mark for clearing it will be the gothic tower of St. Nicholas church, (near Liverpool docks,) open eastward of Rock lighthouse, bearing S. by E.  $\frac{1}{4}$  E. Vessels working in with the flood should also keep to the eastward of this line. It is, however, too close a mark for vessels proceeding out with light winds during the ebb, as the stream sets strongly through the swashways for some time after high-water, and the same oblique set is felt in a degree during the whole of the ebb near the edge of the sand, especially opposite the openings abreast the *red* buoys.

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\* Outward bound vessels passing northward of Formby light-vessel should, on nearing the *black* nun buoy Q. 4, steer more westerly in order to clear the Spit *black* buoy, Q. 3.

**CAUTION.**—In consequence of the extension of the north-east elbow of Great Burbo bank, and it being steep-to, care should be observed on rounding it to keep well in the channel; the *red* pillar bell beacon, marked C. 3, which has been placed to mark Askew spit at the elbow of the bank, serves as a guide in maintaining a mid-channel course between the spit and Crosby light-vessel. It must also be remembered that the long spit lying off and nearly parallel to the east side of that bank, and which is marked by the *red* can buoys C. 4 to C. 7, has a depth of only one foot over it, about one cable south-west of C. 6 *red* buoy.

When Rock lighthouse has been passed the instructions for anchoring given on page 155 must be followed.

It may be useful to know that a crippled ship having entered Crosby channel may beach in comparative safety on tolerably soft ground off the south end of Waterloo terrace, where she will probably beat up close to high-water mark, and be partially protected by a ridge, the surface of which is above high-water of neap tides, whereas on the shore to the northward she would be exposed to a heavy and destructive surf.

**By Night, in a Gale.**—Should a stranger be compelled to find his way through Queen and Crosby channels at night, during a north-west gale, he will have to depend altogether upon the relative positions of the lights, for he cannot expect to see either beacons or buoys. In such a case he should use every exertion to hang off until such time as he is satisfied, after reference to the Tide Table in the Appendix, that there is sufficient depth over the bar for the draught of his vessel, allowing five or six feet for the send of the sea. If it be practicable, he should endeavour to keep the offing till two-thirds flood, for with the great rise of tide in Liverpool bay he may then sail over many of the sands, especially those bounding the bar, which are low, having 5 to 6 feet over them at low-water. The lights used for the bar having been clearly distinguished, that of the Bar light-vessel being *fixed* and *white*, that of Formby light-vessel a *revolving red* light, and those of Crosby light-vessel, *white* and *fixed*\*; pass the Bar light-vessel, being careful to allow for the tidal set, and bring Crosby and Formby floating lights in line, S.E.  $\frac{1}{4}$  E., and steer in. The safety of the vessel will now principally depend on the self-possession of the commander,

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\* Crosby light-vessel carries two subsidiary lights, one forward and the other aft, at 9 feet above the water, to enable inward-bound vessels to distinguish her main light from that of Crosby lighthouse.

The *fixed white* lights at Leasowe, Bidston, and Crosby point, are so masked that they are not seen by vessels, approaching from the westward, within one mile of Bar light-vessel; the south-western masking limit of the light on Crosby point passes over Zebra buoy, which is situated two miles eastward of Bar light-vessel.



the vessel being under well-trimmed and manageable storm canvas, and in the hands of an experienced and vigilant helmsman. Probably not a single cast of the lead could be made sure of, flying, as the vessel would be, on a succession of crested seas; nevertheless, the lead should be kept constantly going. Crosby and Formby floating lights in line, S.E.  $\frac{3}{4}$  E., leads close to Q. 1 and Q. 2 red buoys marking the north-west extreme of Little Burbo bank. The sea running in a more regular trough will be the first indication of the vessel being within the bar, and the distance from thence to Formby light-vessel is little over  $1\frac{1}{2}$  mile, pass to the southward of her, and continue on the same course, S.E.  $\frac{3}{4}$  E., for Crosby floating *fixed* lights. Steer as nearly as practicable in the line between the two light-vessels, for though the channel is about half a mile wide, it admits of but little license in yawing. Pass Crosby light-vessel, on either hand as convenient, and then alter course to about S. by E.  $\frac{3}{4}$  E. This latter course, which will bring the *flashing white* light at the Rock over the starboard cathead, will have to be continued for 5 miles nearly, when the Rock light will be on the starboard beam, and less than half a mile distant; then haul towards the western shore, take the canvas in, and anchor as far to windward as the draught of the vessel, taken in connexion with the rise and fall of the tide, will allow of. Give plenty of cable, and if necessary let go another anchor; for the ground is loose, the bank is steep, and the tide streams are rapid.

It must be remembered that the change in colour of North Docks Wall light from *white* to *red*, landward of the bearing S. by E.  $\frac{3}{4}$  E., shows that a vessel has passed eastward of the line of *black* buoys in Crosby channel, and is dangerously near to Formby bank.

**Tidal Streams.**—From Formby light-vessel the flood stream sets about S.S.E., except during the first-quarter, when it runs about S.E. The ebb sets N. by W.  $\frac{1}{4}$  W. towards the same light-vessel.

**General Remarks.**—It has been observed that there are only two lighted passages into the Mersey for night navigation, namely, by Horse and Rock channels, and by Queen and Crosby channels, and the directions which have been given are, it is to be hoped, so plain that they would effectually aid a stranger unable to procure a pilot in finding refuge through either passage if circumstances should render his keeping at sea impossible. But, in this perilous situation, aggravated perhaps by darkness, squalls, and driving showers of sleet or snow, the seaman may have but little time to make his choice, and a few remarks will, therefore, now be offered as to the principal advantages and risks of both passages, it being of course assumed that he will be thoroughly aware as to how far he can

depend upon his vessel, whether she be one likely to broach-to with a heavy quarterly sea, or whether he can safely rely on her promptly answering the helm.

Queen channel is obviously the most eligible in moderate and clear weather, when all the lights can be seen at night, and the buoys by day, and there are only two courses to be steered from the Bar light-vessel until abreast Rock lighthouse ; but, on the other hand, in strong westerly gales, the whole force of the swell rushing into its entrance produces a tremendous breaking sea, attended by a treacherous undertow which recoils from the steep face of the bar. In such circumstances, the best handled vessel might broach to, or a passing shower might conceal one of the leading lights for a few minutes, and that in a channel too narrow to admit of much deviation from a direct course. In either case the risk would be imminent of being swept upon one of the banks, which are between 4 and 5 miles from the nearest land, and where, should the vessel hold together till daylight, and her situation be observed, she would be directly to windward of the life-boats, and precluded from receiving any assistance. The N.W. light-ship on the contrary, is as near to and in the fairway of Horse and Rock channels; the depth of water is at the least 12 feet more, and where, as the sea is not so turbulent, there is less risk of broaching to. The channel is narrow, yet the weight of the sea will have somewhat diminished before the vessel enters it, and when abreast Spencer buoy, even if Rock light should be obscured by a sudden shower, and the vessel should be stranded as a consequence, she will be within less than a mile of a shore where a look-out is always kept from the lighthouses, and where, at both ends of the channel, life-boats are always held in readiness for launching.

In the bight of the Hoyle between H. 4 *red* buoy and Spencer bell beacon, there is good anchorage over a bottom of mud and sand, and tolerably smooth water until the banks are covered, when a heavy sea will roll in, and if the vessel will not fetch through Rock channel every precaution will be required to ride it out, and should beaching be the alternative, the farther to windward of Hoylake entrance a berth has been taken up the better.

It was mentioned on pages 154–155, that Horse and Rock channels are undergoing change, and should they eventually become more shallow and intricate than they are at present, the preference here given to them will no longer hold good.

**FORMBY CHANNEL.**—Formby old channel was formerly used as the general northern approach to the Mersey, but it is now seldom entered except by coasters. It is a narrow passage or gut bounded on the north-eastern side by the great sandy flat off Formby point called Mad-



wharf, which dries out more than a mile from the sand-hills, and then under the name of Formby spit continues as a shallow bank for  $2\frac{1}{2}$  miles farther to the north-westward. From this spit, the shoal water boundary trends easterly towards the mouth of the Ribble, and south-westerly towards the bar of Queen channel. Jordan bank and the flat extending from it bounds the channel to the south-westward. The inner portion of the channel, between the high parts of the banks, and named Formby pool, ends abreast the life-boat house and flag-staff on Formby point in line; but a narrow swashway between Formby and Jordan banks, named Formby deep, connects the pool with Crosby channel.

On the outer portion of the flat and in the seaward approach to Formby channel, lies a large *black* nun buoy lettered F. N.W., and known as the North-west buoy, in 28 feet at low-water, N.E. by E.  $\frac{1}{4}$  E.,  $1\frac{1}{10}$  mile from the Zebra fairway buoy, and with Formby N.W. marks in line, bearing S.E. by E.  $\frac{3}{4}$  E. One mile farther in on the latter line is the Fairway buoy, a *chequered black* and *white* nun marked FFy., lying upon the flat in 16 feet at low-water, and in the middle of the entrance of the channel. The south-western side of the channel, formed by the steep edge of Jordan bank, is marked by four *red* can buoys, F. 1 to F. 4; and F. 5 *red* can with a perch marks the bar of 4 and 6 feet, between Formby deep and Crosby channel. On the north-eastern side of the channel, half a mile within the *red* buoy F. 1, is a *black* nun buoy F. 1, called Formby point buoy; it marks the steep edge of the Mad-wharf. The channel here is about  $1\frac{1}{2}$  cable wide, increasing to 2 cables into the pool. The north-east entrance of Formby deep is marked by the *black* nun buoy F. 2 which lies at the edge of Formby bank half a mile beyond the pool.

**Directions.**—Running in from the N.W. buoy,\* with Formby north-west marks in line, S.E. by E.  $\frac{3}{4}$  E., the water will gradually shoal from 4 to 3 fathoms, and then to 16 feet at the Fairway buoy, which having been passed, the depths will again increase to 3 fathoms over a muddy bottom. Continue with the marks in line for half a mile within the Fairway buoy, and then steer S.S.E.  $\frac{1}{4}$  E. between the *red* and the *black* buoys, F. 1, marking the channel, and from the Point buoy S. by E.  $\frac{1}{4}$  E. into the pool. The water here is generally smooth when the tide is out, and anchorage may be taken up a little to the north-eastward of the *red* can buoy F. 3, in 5 fathoms at low-water. After half-flood, a vessel may proceed from the pool into Crosby channel through the deep (which is, however, narrow and shallow,) by passing close to the westward of the *black* nun buoy F. 2, and to the eastward of the *red* can buoy, with a perch, F. 5, for Crosby light-vessel.

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\* See footnote, page 153, and Appendix, pages 281 and 282.

Should the buoys at the entrance of, and in, Formby old channel be adrift, or obscured by breakers, keep Formby North-west marks in line, bearing S.E. by E.  $\frac{3}{4}$  E., as before, and run in until Everton church appears only a little open of Crosby point, S. by E.  $\frac{1}{4}$  E.; the latter mark will then lead through the channel, and to an anchorage near the *red* can buoy F. 3 as before.

A vessel having been drifted so far to leeward by westerly gales as to be unable to weather the flats or fetch into either of the other channels, may, by attention to the above marks, avoid the danger of the Ribble banks, and obtain the shelter of Formby pool, where the anchorage is good, but rather rough towards high-water when the banks to the westward are covered. Vessels also in the last stage of distress running into this passage will be within reach of the life-boat stationed at Formby point, where, as well as at Crosby lighthouse, a good look-out is kept, and a blue flag hoisted immediately a vessel is perceived to be in distress.

**At Night,** North Docks Wall light changing in colour from *white* to *red* on a S. by E.  $\frac{3}{4}$  E. bearing indicates the approach to Formby channel from the bay. Crosby light is so masked as not to show when bearing to the southward of S.S.E.  $\frac{3}{4}$  E.; whenever, therefore, the light is seen by a vessel outside Formby spit she must be to the westward of the line of Mad-wharf sands, and if she approach the light, keeping it in view on that bearing, she will pass over Formby spit where it has a low-water depth of 10 feet, and into Formby channel close to the westward of the *black* nun buoy F. 1. When within this buoy a more southerly course must be kept towards the pool so as to avoid the flat.

**CAUTION.**—The losing sight of Crosby light on a clear night by a vessel 5 or 6 miles to the northward should admonish her that she is too far to the eastward, and exposed to the dangerous indraught of the estuary of the Ribble.

**LIVERPOOL.**—This city, parliamentary borough, and seaport is situated on the east side of the estuary of the Mersey, and is distant by railway from Birmingham, 134 miles; Bristol, 188; Edinburgh, 197 $\frac{1}{2}$ ; Glasgow, 201; Hull, 130; Lancaster, 49; Leeds, 75; London, 201; Manchester, 31 $\frac{1}{2}$ ; and York, 104. Also by sea, 156 miles from Belfast; 300 from Cork; 138 from Dublin; 3,048 miles from New York; and from Quebec, 2,634 miles.

The city occupies the slope of a moderately rising ground from about 2 miles within the river, the principal elevation being Everton hill at the north, 230 feet, and Edgehill upon the south, 210 feet above high-water. From the latter, three tunnels are cut through the red sandstone communicating from Edgehill station with the central terminus of the railway at

Lime street, and with the docks at Wapping, and northward, to the Waterloo road and docks. Liverpool has many handsome public buildings, such as the custom-house, town-hall, railway station, markets, and several churches, but the largest and most imposing erection is St. George hall, in which, besides the necessary courts for the assizes, are large halls for festivals and other public meetings.

The docks are, however, the most magnificent structures from a commercial point of view, and occupy above 4 miles along the river face, with an extension of the wall for a mile farther north bounding a space reserved for like purposes. The first dock was opened in 1720, and comprised an area of 3 acres, 1,890 yards, with a quay space of 557 linear yards; the Salthouse and George docks succeeded in 1753 and 1771; since which date the commerce of the port has made such rapid progress as from time to time to necessitate the construction of additional shipping accommodation, which has resulted in their present magnitude. The first, or Old dock, was filled up in 1831; and there are now, in 1882, 38 principal docks entered by gates, besides open basins, the whole comprising a water area of 342 acres 3,433 yards, and a linear quay space of 23 miles 612 yards; there are also 22 graving docks and two gridirons for the repair of shipping.\* Two batteries command the entrance of the river, one near Rock lighthouse, the other near Canada dock, at the north end of the town,

**Landing Stages.**—Off Prince and George piers are two floating landing-stages, 1,002 and 505 feet long; there is also a smaller one at the south end of the town near Harrington docks; they are connected with the dock walls by seven bridges, and the two first have at all times deep water alongside.

**Dock Arrangements for Trade, and Signals.**—It may be of service to vessels entering the Mersey, and in reference to the anchorage the master may take up, to be informed that for the convenience of traffic special facilities are afforded for certain trades in particular docks. Thus, quays in Brunswick, Huskisson, and Canada, docks are especially adapted to the landing of timber, and according to general practice these docks may be said to comprise the timber trade. Warehouses, under the management of the Dock Board, are attached to Wapping, Albert, and Stanley docks; these, therefore, afford peculiar facilities for imports requiring immediate warehouse protection. Corn warehouses are established at Waterloo dock, Liverpool, and in Birkenhead East Float. Clarence half-tide, Clarence, Trafalgar, and Collingwood docks, are devoted to steamers in the coasting trade, and Huskisson, Nelson, and Wellington docks, to foreign-going steamers. These appropriations are subject to the discretion

\* For the detailed list of names and dimensions, see Appendix, pages 275-279.

of the Board, and to such arrangements as may from time to time be deemed requisite for the general convenience of trade.

A flag, blue and red, kept flying on the pier-head at the entrance of each dock, signifies that vessels may not enter; the lowering of the flag implies permission to enter, and while it is down the dock is open to all comers. The dock gates are opened at about two hours before high-water, and are closed at the turn of tide; if the flag is kept flying while the gates are open it implies that the dock is full.

**Correcting Compasses.—Time Gun.**—In the Mersey two special conveniences are provided for the practical purposes of navigation—First, Liverpool dock walls are marked with figures denoting the number of degrees from the magnetic north of the bearing of Vauxhall iron works chimney, which is the highest chimney in Liverpool. These marks are visible from all parts of the anchorage, except in the extreme north or south, and whichever one happens to be intersected by the line of bearing of the chimney, signifies to the observer the angle from the magnetic north of the line of bearing; this compared with the compass bearing at once indicates the error of the compass, and by watching the bearing with the swinging of the ship, a table of deviation for every point of the compass through which the ship's head passes may be readily framed. Secondly:—On the pier of Morpeth dock at Birkenhead, a little north of Woodside landing-stage, a gun is stationed, which is fired every day at one o'clock p.m., Greenwich mean time, the time being regulated from the observatory on Bidston hill; and this is accomplished with such accuracy that the flash of the gun may be reckoned upon as a thoroughly reliable means of testing the rates of chronometers, if a ship happens to be detained for a few days in the river.

**Railway and Steam Communications.**—The railways in immediate connection with the town of Liverpool are the Liverpool and Manchester, the first constructed and opened June 14, 1833; a branch from Edgehill station runs below the east fall of the hill to Bootle, with a tunnel from near Walton to the west end of the docks; the Liverpool and Warrington line from the same station; the Lancashire and Yorkshire, from near the exchange; the Liverpool and Southport, passing Seaforth and the watering places along the north shore; and the line which runs between the docks and the town, and on to Garston, where it joins by a branch the railway to Warrington.\* The Leeds and Liverpool canal has its terminus within Prince dock, and is connected with Stanley dock. There is communication by water, both for passengers and goods traffic, with nearly

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\* A tunnel is now (1883) in course of construction under the Mersey, from Liverpool to Birkenhead, for the purpose of connecting the railways on either side of the river.

every home, colonial, and foreign port of note in the world. Liverpool is the port of exchange for the manufactures of the surrounding districts and the produce of other nations; that of the raw material, cotton especially, being the largest imported article.

The first steam-vessel was started in Liverpool in 1815; steam-ships now sail direct to London and the chief intermediate ports; between the Clyde and the Bristol channel, to Dublin, and to most of the ports round Ireland. To Western Europe, from Drontheim to Gibraltar and up the Mediterranean; the west coast of Africa, round the Cape to Natal; the West Indies, and North and South America; and from the St. Lawrence to Monte Video; the average passage to New York, with which there is communication four times a week, being about 9 days.\*

**Floating and other Nautical Institutions.**—Near the custom-house is a large and commodious Sailors' Home, which is capable of accommodating about 300 men; and at the north end of the town is a branch home for 200 men. There is an Aged Merchant Seamen and Widows' Fund; a home for aged mariners, at Egremont; and a Seamen's Orphan Institution, on an extensive scale, in Newsham park, was opened in 1868. Moored in the Sloyne are the following ships, which are lent by the Government for the under-mentioned purposes:—

*Conway*, late *Nile*, a self-supporting school for educating the sons of gentlemen as officers for the mercantile marine, off Rock Ferry.

*Indefatigable*, supported by voluntary contributions, for preparing the sons and orphans of sailors, and other poor and destitute boys, for service in the mercantile marine, off New Ferry.

*Akbar* (Protestant) and *Clarence*† (Roman Catholic) reformatory ships, Government grant, off New Ferry.

**Limits of the Port.**—The limits of the port commence at the Red Stones in Hoylake, where the boundary of Chester terminates, and continue up the river Mersey to Inceferry, thence crossing the river to Dungeon point, and along the Lancashire coast to a stream of water commonly called the Hundred End, on the south side of the river Ribble, and extend seaward to the distance of 3 miles from the low-water mark.

**Manufactures and Commerce.**—The manufactures of Liverpool are chiefly connected with ships, their stores and machinery; for which there are several building and repairing establishments, foundries, roperies, factories for chain cables, anchors, and steam engines. There are also potteries, sugar refineries, and soap works.

\* The time occupied on the passage between Liverpool and New York is being further reduced. In September, 1882, the *S.S. Alaska*, of the Guion line, made the passage from New York in 7 days 2 hours actual time.

† The *Clarence* was destroyed by fire, and sunk at her moorings, on 18th January 1884.



The imports comprise the products of the East and West Indies; raw cotton, timber, flour, and grain from America; hemp, tar, tallow, &c. from the Baltic; and an immense amount of live stock and provisions from Ireland. The chief exports are cotton goods and woollens, manufactured articles of every description, salt in large quantities from the neighbouring mines, and coal.

The custom-house returns for 1882 were as follows:—

The number of vessels belonging to the port, which under this head includes the creek at Garston,—Sailing vessels, 1,793=1,018,148 tons. Steam-vessels, 750=691,565 tons. Coasters, inwards, 15,981=6,832,711 tons; outwards, 15,141=6,545,649 tons. Foreign, inwards, 1,502=1,018,692 tons; outwards, 1,484=1,005,299 tons.

The population of Liverpool in 1881 was 552,425. In 1831 it was 205,964.

**BIRKENHEAD.**—This populous and rapidly increasing town is situated upon the Cheshire shore directly opposite Liverpool. The shallow pool of Wallasey which formerly bounded it upon the north has been converted into extensive docks, called the East and West Floats, which, with other docks and basins, have a water area of  $164\frac{1}{2}$  acres; there are also three graving docks and two gridirons. Ship-building in wood and iron embracing every class of vessel is carried on, on a large scale, and there are also several manufactories. Population in 1881, 83,824. On either side of Birkenhead along the shore are populous towns and parishes, New Brighton, Liscard, Egremont, and Seacombe, upon the north side; and to the south, Tranmere, Broomborough, and Eastham. There is direct railway communication with Chester 15 miles, and by a branch line turning off from a distance of seven miles at Hooton, to Neston and Parkgate on the shore of the Dee. There is also a short detached line leading from the north end of the docks to Hoylake. Birkenhead is within the port of Liverpool, and the town is governed by joint commissioners; indeed the whole district named may be considered a prosperous and healthy suburb of its important commercial neighbour.

**Ferries and Distinguishing Lights.**—Several ferries connect the two shores, running between the landing-stages near George dock and the following piers, all except that of Egremont, extending to low-water mark:—New Brighton, Egremont, Seacombe, Woodside landing-stage, Monks, and South Birkenhead; Tranmere and Rock, abreast the Sloyne and Quarantine ground; New Ferry and Eastham or Carlett, the latter is distant from the landing-stage at Liverpool nearly 5 miles. At the several piers or landing-stages lights are exhibited; their colour and arrangement are under no general control; some are merely ordinary lamps, others are refracted, such as at Woodside, New Ferry, New Brighton,

&c. The following are the distinguishing lights at the principal landing-stages and ferries to and from the railway terminus at Birkenhead :—

Prince landing-stage, on which life-boats are stationed, and a ball hoisted when the crews are required to assemble, is distinguished by a *green* lamp over the centre of each of the four bridges.

George landing-stage, a triangle of three lights at each end, those at the north are *white*; the south *red* over two *white*. On George landing-stage and also near George dock gates, a *red* ball by day and a *red* light by night, is shown when the gates are open, and the communication over the bridge is for the time cut off.

South-end landing-stage shows a *red* light in the centre and a *white* light at each end, and during the hours when the tide permits the passage of steam-vessels over the sands, a *red* light is shown by night, and a *red* and *white* ball by day.

On Woodside landing-stage, Birkenhead, a *white* *fixed* light is exhibited from a tower; it is further distinguished by a triangle of three lights, *white* over two *red*.

Monkaferry slip at the railway station has one bright reflected light of the ordinary colour.

**UPPER MERSEY.**—That portion of the estuary above Liverpool, called the Upper Mersey, is dry at low-water, with the exception of the winding course of the river and deep water bights or blind channels running up from between Dingle point and Broomborough pool. From off Brunswick dock, Pluckington shelf dries out about 2 cables, extending with a gradual decrease in width, both north and south, to George dock and Dingle point, and having a shallow of from 3 to 12 feet one cable beyond it. Off the Cheshire shore, sands with some patches of rock dry out from Tranmere pier-head to 3 cables outside of the Broomborough shore, with a shelf of from 5 to 12 feet, extending 2 cables off New ferry pier-head; between this and Tranmere are the Quarantine ground, and Sloyne road. The greatest depth across between New ferry and Dingle point is 5 fathoms at low-water; between Tranmere pier and Coburg dock, 10 fathoms; and between Alfred dock, Birkenhead, and Princes landing-stage, where is the narrowest part of the river, 8 and 9 fathoms.

**Buoys.**—Above New ferry to Eastham ferry the channel at low-water gradually decreases in width, and the depths are also very irregular, from  $2\frac{1}{2}$  to  $4\frac{1}{2}$  fathoms; it is bounded on the east by Eastham bank, which is dry at low-water to abreast Broomborough stream or Dibinsdale brook. North of Shodwell is a space reserved for the powder hulks.\* A narrow gut, having from 4 to 2 fathoms, runs up towards Garston between Devils bank and the Dingle; the channels are subject to constant

\* See Appendix, page 283.

change, and the buoys, which are under the control of the Upper Mersey Navigation Commissioners, are moved when occasion requires; they are laid down upon the same system as those at Liverpool.

**LIGHTS.**—There is also a light-vessel moored in the channel above Garston, but her position is equally subject to change. This vessel exhibits a *white* reflected light from 4½ hours before to 4 hours after high-water, when an ordinary globe lamp is substituted.

**Fog Signal.**—A large bell is sounded during foggy weather.

On the Cheshire shore, one mile below Ince ferry, is a lighthouse which is not at present (October, 1882) in use, but a light is shown from a tower upon Hale head opposite.

*Red* lights are shown on each side of the three piers of Runcorn viaduct, between which are the navigable arches; the lights are on the cutwaters, and about 19 feet above ordinary high-water. Besides the foregoing lights there are others at the several docks hereafter described. No directions would be of any service because they could not be depended upon for any length of time.

Parties interested in the upper navigation have their offices in Liverpool, and provide pilots and steam-tugs when required.

There is a considerable traffic by river craft and other small vessels between the docks at Liverpool and those in connection with the inland and canal navigation; and the ports or places of communication as far as Warrington are as follows:—

**GARSTON** is 4½ miles above George landing-stage. There are two wet docks, one of 6 acres, entered by gates 50 feet wide, the sills being 6 feet below that of the Old dock at Liverpool; the other dock, which was opened in June 1875, has an area of 8 acres, the entrance is 55 feet wide, and the depth over the sills is 27 feet at springs: there is also a gridiron 300 feet in length. The docks are furnished with 20 hydraulic cranes, and 8 high level coal tips. Garston docks are adapted for vessels of considerable burthen, and they belong to the London and North-western Railway Company.

**Signals.**—At the dock entrances, a flag is hoisted by day and a *red* light by night when the docks are blocked; when clear, there is no flag, and a *white* light is shown. Garston is a creek of Liverpool. The population in 1881 was 10,131.

**WIDNES** is a little above Runcorn Gap, and 8¼ miles from Garston by the channel; the dock belongs to the same company, and is about 1½ acre in extent, with an entrance 22 feet wide, and a depth at springs of 12 feet. It is in connection with the Sankey canal, and the London and North-western railway. The lower pond of the Sankey canal between



the lock and iron swing bridge is also used as a dock for vessels not drawing more than  $7\frac{1}{2}$  feet; it is furnished with 4 steam cranes. The locks are 78 feet long and  $19\frac{1}{2}$  feet wide.

**WARRINGTON** is a parliamentary borough situated upon the north side of the Mersey. The river here takes several sharp bends, and is crossed by one road, and three railway bridges, beyond which it is made navigable by weirs and locks, and unites with the Irwell navigation to Manchester, 20 miles. Vessels carrying from 80 to 150 tons get up to Bank quay at high-water springs. The town has several manufactories, and the population in 1881 was 41,456.

**RUNCORN.**—The Bridgewater and Old Quay docks, at Runcorn, are large and well adapted for the purposes of trade, having connection with an extensive inland navigation and railway system; they belong to the Bridgewater Navigation Company.

The **Bridgewater docks** are eight in number, comprising a water area of about 16 acres, with entrances from 50 to 21 feet wide, and having the same depth over the Tidal dock sill as was over the sill of the Old dock of Liverpool, or as given in Holden's tables. There is also a grid 150 feet long and 40 feet broad.

The **Old Quay docks** are three in number, with a combined extent of 3 acres; the width of entrance is 32 feet, and the depth 3 feet less than the Bridgewater docks. These docks are connected by river and canal with Warrington and Manchester, and thence with the whole system of inland navigation.

**Signals**, at tide-time, both here and at the Bridgewater docks are the same, viz:—during day, a flag at the signal-mast head when the road is clear; a flag half-mast high when there is no entrance.

By night, when the road is clear, a *white* light is shown; when vessels must move slowly and cautiously, a *green* light is shown; when there is no entrance, a *red* light is displayed.

**Steam Tugs.**—The Company have powerful steam tugs which ply every tide between Liverpool and Runcorn; and vessels with cargoes for their docks, to be discharged by their men, are towed free of charge.

Runcorn is a custom-house port, the boundaries joining with those of Liverpool on both sides of the Mersey, and include Weaver docks at Weston point, Widnes, and Warrington.

The returns for 1882 were,—vessels belonging to the port, 159 of 9,425 tons. Coasters, inwards, 2,611=215,782 tons; outwards, 2,464=207,555 tons; foreign, inwards, 83=15,162 tons; outwards, 74=13,822 tons.

The population in 1881 was 15,133.

**WESTON** is upon the same or Cheshire side of the river,  $1\frac{1}{2}$  mile below the Gap; the Weayer Navigation Trustees have here three docks in connection with the canal and river to the salt-works near Northwick,  $13\frac{1}{2}$  miles. The united extent of the dock accommodation is 4 acres, and they are entered by gates 50 feet wide, and having 19 feet over the sill at high-water springs.

**Signals.**—When the gates are not open or navigation is obstructed, a ball is hoisted by day and a *red* light is shown at night.

**ELLESMERE PORT** is about  $8\frac{1}{2}$  miles above Liverpool, on the Cheshire side of the Mersey. It belongs to the Shropshire Union Railways and Canal Company, and is the terminus of their canals. The docks comprise about  $3\frac{1}{2}$  acres with an entrance width of 33 feet, and a depth over the sill about one foot less than the Liverpool datum: the depth of water in the dock is 14 feet. There is a lock 105 feet long and 32 feet wide for roasting vessels, and another for smaller craft 75 feet long and  $14\frac{1}{2}$  feet wide, also a patent slip for vessels of 300 tons.

**A Lighthouse** upon the north side of the entrance to the docks shows a *fixed white* light while there is water to the depth of 7 feet on the sill of the locks.

Vessels bound for this port are towed free of charge on notice being given at the Company's offices at Liverpool.

Ellesmere port is a station of the Hooton and Helsby branch railway; it is included in the port of Liverpool for custom-house returns.

**TIDES.**—On a spring rise of 21 feet above the datum of the Old Dock sill, Liverpool, the following range was ascertained by the Marine Surveyor of that port in 1861. At Garston, the surface level was about one foot above the high-water level, and at Warrington  $3\frac{1}{2}$  feet; affording at Garston a rise of 32 feet; at Ellesmere port, 30 feet; at Weston point, 18 feet; at Runcorn gap, 16 feet; and at Warrington, 9 feet; all above the surface water, which at Warrington was 16 feet above the datum of Liverpool. The low-water level of a spring tide or 10 feet below datum, reached to near Ellesmere, above which there was an incline of surface water depending on the amount of fresh in the river. A neap tide of 10 feet above datum reached to Fidlers ferry about half-way between Runcorn gap and Warrington, affording a depth at the former place of 4 feet.

The duration of a spring flood is  $2\frac{1}{2}$  hours at Runcorn, and 1h. 40m. at Warrington bridge.

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## CHAPTER VI.

## FORMBY POINT TO ST. BEES HEAD.

VARIATION IN 1884.

Morecambe bay - - - 20° 20' West.

Low sand-hills extend from Formby point N.E. by E. for 6 miles to Southport. The strand beyond bounds the south-east side of the estuary of the Ribble. The sandy shelf in continuation of the Mad-wharf, has a low-water breadth of nearly one mile all the distance to Southport.\*

**SOUTHPORT** is a much frequented watering-place, stretching for about 2 miles along the shore, and fronted by a promenade and sea-wall; its well-built houses and public buildings form a conspicuous feature from the sea. The population in 1881 was 32,191.

**Pier and Light.**—From off nearly the centre of the town a pier upon iron piles projects for 1,450 yards in a N.W. by N. direction, at the head of which is exhibited a *fixed white* light.

**Life-Boat.**—A life-boat is stationed at Southport.

**RIVER RIBBLE** has its rise near Gearstones, in the West Riding of Yorkshire, at the east foot of Whernside, which is elevated 2,414 feet; it flows first southward to Settle, 12 miles, then south-westerly, entering Lancashire near Clitheroe, 22½ miles, and arrives after many bends at the town of Preston, 57 miles from its source; its two chief tributaries being the Hodder from the north, and the Calder from the south-east, both joining about 3½ miles below Clitheroe. Passing south of Preston the river becomes navigable, and widens out into a broad estuary, the stream, however, being confined for 7 miles between stone embankments. On the northern shore are the villages of Freckleton, Lytham, and St. Anne, while the opposite shore (equally low) is varied by those of Hesketh bank, Crossens, and North Meols, and the town of Southport.

**LIGHTS.**—At **Stanner point**, close to the beach, is a stone tower, from the lantern of which, elevated 81 feet, an *intermittent white* light is exhibited, showing for *three and half minutes*, and eclipsed *half a minute*; it is visible at a distance of 12 miles.

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\* See Admiralty chart, England, west coast, Formby point to Firth of Solway, No. 1826; scale,  $m = 0.5$  inch. The directions from Formby point to Fleetwood are the result of a survey by Staff Commander W. E. Archdeacon, 1883.

**Lytham.**—At the head of the pier at Lytham is a *fixed-white* light, shown from about 2 hours before, to  $1\frac{1}{2}$  hour after, high-water; which, by an arrangement of clockwork, is extinguished when the tide will not allow vessels to get up to the port.

**SANDS and BUOYAGE.**—Between Stanner point and Southport the estuary of the Ribble is 5 miles wide, and sands, which are uncovered at low-water, extend out about 4 miles beyond that line, and across the mouth, between the village of Southshore and Anisdale bank, for a distance of nearly 9 miles. The principal of these dangers are, beginning with the southernmost, Horse banks, Salthouse bank, and Crusader bank. Between and through these sands the channels into the Ribble, namely, South channel, the Penfold, the Gut, and North channel, converge irregularly to a point of junction on the north shore near Lytham, from whence a single channel flows to Preston; that portion of it between the Naze and Preston, a distance of 7 miles, being embanked, as already mentioned.

**Fairway Buoy.**—The sea fairway to the channels of the Ribble, of which the two northern may be considered navigable, is marked by a *black* conical buoy, named the “Nelson of Preston,” with a staff and ball, and visible about 3 or 4 miles off in clear weather; it lies in 6 fathoms at low-water, and has its name marked upon it. From this buoy, Formby N.W. land-mark bears S.  $\frac{1}{3}$  E., distant  $9\frac{1}{2}$  miles; Southport pier-head, S.E. by S., 7 miles; Ribble lighthouse, E.  $\frac{1}{4}$  S.,  $5\frac{9}{10}$  miles; Blackpool church tower, N.E. by E.  $\frac{1}{3}$  E.,  $7\frac{1}{4}$  miles; and Formby N.W. black buoy, S.S.W.  $\frac{1}{3}$  W.,  $9\frac{1}{2}$  miles.

**South Channel** has its entrance to the southward of Horse bank, and 3 miles westward of Southport pier; like all the other entrances it has a bar, on which there is 4 to 5 feet at low-water.

**Buoys.**—A *black* and *white horizontally striped* buoy marks the outer edge of the bar; from it, Nelson buoy bears N.  $\frac{1}{3}$  W., distant  $6\frac{7}{10}$  miles; Southport pier-head, E. by N.  $\frac{1}{3}$  N.,  $3\frac{3}{4}$  miles; Formby N.W. landmark, S. by W.  $\frac{1}{3}$  W.,  $3\frac{1}{2}$  miles; Formby N.W. black buoy, W. by S.  $\frac{3}{4}$  S.,  $4\frac{6}{10}$  miles; and black inner buoy, East,  $1\frac{2}{10}$  mile.

An inner buoy, painted *black*, lies near the margin of Horse bank, with the outer buoy bearing West, distant  $1\frac{2}{10}$  mile; Southport pier-head, E. by N.  $\frac{3}{4}$  N.,  $2\frac{6}{10}$  miles; and Formby N.W. landmark, S.S.W.  $\frac{3}{4}$  W.,  $3\frac{3}{4}$  miles.

**Anchorage.**—Safe anchorage may be had in Bog Hole, above Southport pier, in 5 to 7 fathoms at low-water, with the pier-head bearing about S.S.W.  $\frac{1}{3}$  W., distant one to two cables; the space being limited, it is advisable to moor.

**Directions.**—Having sighted the bar buoy, bring the spire of Christ church on with the north-west end of the winter garden, bearing E.  $\frac{1}{3}$  N.,

which will lead southward of the buoy and across the bar in the deepest water, then steer so as to pass to south-east of the black buoy, and from thence for the pier-head, E. by N.  $\frac{1}{2}$  N. ; as the latter is approached, keep rather to the southern side of the channel, as Horse bank projects slightly to southward, pass the pier at the distance of about half a cable, and anchor in Bog Hole. To proceed above the anchorage a pilot is necessary.

**Supplies** of all kinds may be obtained at Southport; water is delivered from a pipe at the pier-end, and a lighter with from 60 to 80 tons of coal on board is always ready to supply vessels calling in.

**Penfold Channel** is fast filling up, and is not used as a navigable passage.

**The Gut**, which is the principal entrance into the Ribble, is a narrow and tortuous channel between Horse and Salthouse banks; it joins North channel nearly abreast the lighthouse, and is marked by *black* nun buoys, with cages, numbered 1 to 8; they are generally in the deepest water, being shifted as changes occur. The bar of the Gut is between Nos. 1 and 2 buoys, and has from 2 to 5 feet over it at low-water springs; the outer, or No. 1 buoy, which is well outside the bar, lies in a south-east direction  $1\frac{6}{10}$  mile from Nelson buoy, in  $3\frac{1}{2}$  fathoms at low-water.

**North Channel** has three entrances; the southern passage, which is the deepest, forcing its way through the north end of Salthouse bank, at Nix Hollow, has from one to three feet in it at low-water; it is, however, not buoyed, and cannot therefore be used by a stranger. The middle entrance, between Salthouse and Crusader banks, has an easterly direction for 2 miles from the outer buoy, when the channel bends sharp to southward and runs nearly straight to a *black* and *white vertically striped* buoy abreast the lighthouse, it then turns to the south-east, joins Gut channel above No. 7 buoy, and thence runs in an E. by S. direction to abreast Lytham. This channel is marked by *dark red* nun buoys, numbered 1 to 6, the outermost buoy being generally about 3 miles in an E.N.E. direction from Nelson buoy. Nos. 1 to 4 lie in a general E. by N. direction, and Nos. 4 to 6 in a S. by E.  $\frac{1}{2}$  E. direction. The bar is situated between Nos. 2 and 4 buoys, the inner portion of it drying about one foot at low-water springs; and the channel from No. 4 to No. 6 buoy has then a depth of from 12 to 14 feet.

The northern entrance is through Crusader bank, with St. Anne church bearing about S.E.  $\frac{3}{4}$  S., and dries one foot at low-water springs.

From Lytham, the narrow shallow channel runs near the shore for one mile to the dock entrance gut, and then winds towards the Naze, being marked at intervals by perches and *black* buoys upon the port hand, and by *red* buoys upon the starboard hand up to the embanked junction of the

river Douglas. From thence the embankment on either side of the cut up to Preston is marked by perches.

**Anchorage.**—In North channel, between Nos. 4 and 6 buoys, fair anchorage may be had in 12 to 14 feet at low-water, the best berth being just below No. 6 buoy. At the distance of about one cable above that buoy, the bank dries across the channel at low-water springs.

**TIDES.**—It is high-water, full and change, at the Ribble lighthouse, at 10h. 51m.; springs rise 24 feet, neaps 17 feet. At Preston, it is high-water at 11h. 49m.; the rise 10 feet at springs, and  $4\frac{1}{2}$  feet at neaps. The time of high-water at Lytham is 2 hours later than at the outer buoys of the channels.

**Pilots.**—Vessels requiring pilots should make the signal when first coming in sight of the lighthouse, and the pilots will also go to any port to conduct vessels up the Ribble upon application to the harbour-master at Lytham.

There are two steam tugs, the rate of towage per ton being 1s. 4d. from No. 1 buoy to Preston and back; and from No. 1 buoy to Lytham 6d. per ton.

**Directions.**—From the general intricacy of the channels into the Ribble and the constant changes which take place, no stranger should use them except he be assisted by a pilot. Being necessitated, however, to proceed in without such assistance, and having Nelson buoy near at hand, steer from it as a point of departure to the entrance of the Gut, or North channel, as circumstances of weather may render preferable, and having closed the outer buoy marking the channel, then steer from buoy to buoy. Having arrived abreast Lytham, anchor on the flat above the pier, and obtain assistance.

Vessels waiting tide to reach Preston generally lie for security in a small gut or creek, one mile above Lytham, which has also been adapted to serve the purposes of a dock, the channel to it being marked by small perches. Vessels drawing 12 to 15 feet may reach Preston at springs, and southerly winds have the effect of materially increasing the rise of tide in the river.

**Life-Boat.**—A life-boat is stationed at Lytham, which is also a coast-guard station.

**Preston** is a parliamentary borough of ancient date, and a very important cotton manufacturing town of Lancashire; it is 210 miles by rail from London,  $36\frac{1}{2}$  from Manchester, and  $20\frac{1}{2}$  from Lancaster. The town is finely situated, and the river, winding round two sides of it, is crossed by several road and railway bridges. The commerce of the port, which includes Freckleton, Lytham, and Hesketh, is chiefly confined to the coasting trade. Ship-building in wood and iron is carried on to some extent; there

is a patent slip adapted for vessels of 260 tons, and a gridiron 120 feet long; there is also a patent slip at Freckleton, 6 miles below, to which vessels of 14 feet draught can get at spring tides.

The custom-house returns in 1882 were as follows:—The number of vessels belonging to the port, 84, amounting to 5,447 tons. Coasters, inwards, 211=13,674 tons; outwards, 218=14,630 tons; foreign inwards, 1=128 tons.

The population in 1881 was 96,532.

**Lytham** is a watering-place 10 miles by the river from Preston; it has a railway to Blackpool,  $7\frac{1}{2}$  miles, and a branch to the line between Preston and Fleetwood; steamers also in summer run between it and Southport. There is a handsome pier upon iron piles, running out 900 feet to the low-water margin. Lytham is a creek of the port of Preston. The population, many of whom are employed in the fisheries, was in 1881 4,122.

**St. Anne** is a rising village situated a short distance to northward of Stanner point lighthouse. An iron pile pier, extending out from the coast-guard station to low-water margin, is now (1883) in course of construction.

**COAST.**—From the estuary of the Ribble the shore trends in a general N.N.E. direction for 8 or 9 miles to Rossall point, the south-west horn of Morecambe bay.

**Blackpool.**—The coast is low and sandy to Southshore, but rises at Blackpool; both these places are bathing stations, and contain a superior class of houses, generally facing the sea. Each has a tower church; that at Blackpool is the larger, and, being upon higher ground, is one of the most noticeable objects on the coast.

**Piers and Lights.**—From abreast Blackpool church an iron pile pier projects in a western direction for 1,650 feet, including a landing-stage of 300 feet; at the head there is a depth of 22 feet at springs, and from it a *green* light is shown all night, having Walney light-house bearing about north. Half a mile farther south is a similar pier of 1,400 feet in length, from the head of which a *fixed red* light is exhibited all night.

During summer, steamers ply to Southport, Piel, &c., and there is railway communication to Lytham, and by a branch to Poulton-on-Wyre. The population of Blackpool in 1881 was 14,448.

**Life-Boat.**—Blackpool is a life-boat station.

The country, though for the most part flat, is relieved by gentle and well-cultivated eminences, over which villages, gentlemen's seats, and farmsteads are interspersed. The coast line declines in height from Blackpool to Rossall point, the red clay cliffs being succeeded by a sandy bank abreast Bispham.

**ROSSALL POINT** is distinguished by a lofty beacon of wood 57 feet high, which at a distance may easily be mistaken for the pile lighthouse at the mouth of the Wyre.

**MORECAMBE BAY.\***—Morecambe bay, an extensive inlet of the Lancashire coast, is  $9\frac{1}{4}$  miles wide at its entrance between Rossall point and Walney island, and 14 miles deep to the entrance of the river Kent. At low-water, four-fifths of this indenture is occupied by dry sand, which is intersected by the various channels representing the outfalls of the rivers Wyre, Lune, Kent, and Leven. Instead of describing the bay and its dangers as a whole, it will be more convenient to notice in order the several ports within its boundaries, with the sands, &c. in the approach to them.

**LIGHT VESSEL.**—A light-vessel is moored in 12 fathoms, W.  $\frac{1}{8}$  N.,  $17\frac{3}{4}$  miles from Wyre lighthouse; her hull is painted red, with "Morecambe bay" on her sides, and she carries one mast surmounted by a red ball. From a lantern elevated 38 feet a *red* light is exhibited, which *revolves every thirty seconds*, and is visible in clear weather at the distance of 10 miles.

**Fog Signal.**—A fog siren is sounded in thick or foggy weather, giving *one blast every two minutes.*† From the light-vessel,

Orme head lighthouse is	-	S.W. $\frac{1}{4}$ S.	-	36 miles
Point Lynus lighthouse -	-	S.W. by W. $\frac{3}{4}$ W.	-	40 "
Skerries lighthouse, over Ethel rock	-	W. by S. $\frac{1}{3}$ S.	-	48 "
Chicken rock lighthouse	-	N.W. by W. $\frac{1}{4}$ W.	-	$48\frac{1}{4}$ "
St. Bees head lighthouse	-	N. by E. $\frac{1}{2}$ E.	-	37 "
Walney lighthouse	-	E. by N. $\frac{1}{8}$ N.	-	15 "
Wyre lighthouse -	-	E. $\frac{1}{8}$ S.	-	$17\frac{3}{4}$ "
Ribble or Nelson buoy, generally	-	S.S.E. $\frac{1}{4}$ E.	-	$16\frac{1}{4}$ "
Liverpool N.W. light-ship	-	S.S.W.	-	$23\frac{1}{2}$ "

**RIVER WYRE**, which discharges itself on the south side of Morecambe bay, has its source on the moorland borders of the West Riding of Yorkshire. Near Garstang church,  $16\frac{1}{2}$  miles from its source, it receives the Calder, and 7 miles beyond reaches Cartford bridge where the river expands, and below the town of Poulton-le-Fylde has a broad estuary, called Wyre water; the sea outlet is a narrow channel by the town of Fleetwood, which is situated upon the western point 9 miles from Cartford bridge, or 32 miles from the source of the river.

\* See Admiralty chart, England, west coast, Formby point to the Firth of Solway, No. 1,826, scale,  $m = 0.5$  inch; and Morecambe bay, No. 2,010, scale,  $m = 2.2$  inches.

† See regulations respecting light-vessels, and vessels marking wrecks, page 30.



**LIGHTS.**—Wyre Lighthouse is painted red, and is upon screw piles at the north-east elbow of North-wharf bank, at the junction of Wyre outfall with Lune Deep or Foot of Wyre; it shows a *fixed white* light, 30 feet above high-water, and visible at the distance of 10 miles in clear weather.

**Fog Signal.**—A bell is sounded at the lighthouse in foggy or snowy weather, *three strokes per minute* with an interval of *one minute*.

Signals are also made by the light-keeper in case of vessels being observed in distress, or requiring pilots.

The following are the principal bearings and distances from Wyre lighthouse:—

Danger patch buoy	-	-	-	W.N.W.	-	3 miles.
King scar buoy (over bank)	-	-	-	W. $\frac{1}{2}$ N.	-	1 $\frac{1}{2}$ "
N.W. buoy of Lune, No. 1. (over sand)	-	-	-	N.E. $\frac{1}{2}$ E.	-	1 $\frac{1}{2}$ "
Grange channel light-vessel (over flats)	-	-	-	N.E. $\frac{3}{4}$ N.	-	4 $\frac{1}{2}$ "
Walney lighthouse (over flats)	-	-	-	N. by W. $\frac{3}{4}$ W.	-	7 $\frac{3}{4}$ "
Hilpsford bell buoy	-	-	-	N.W. $\frac{3}{4}$ N.	-	8 $\frac{1}{2}$ "
Morecambe bay light-vessel	-	-	-	W. $\frac{1}{4}$ N.	-	17 $\frac{1}{2}$ "
Fairway buoy	-	-	-	N. by W. $\frac{1}{2}$ W.	-	1 $\frac{1}{2}$ "

**Fleetwood Lighthouses.**—There are two lighthouses at Fleetwood. The higher one, of stone colour, with a red lantern, being in the town, and the lower, of stone, with a colonnade round its base, on the shore margin of the esplanade; they bear from each other N.  $\frac{1}{4}$  W. and S.  $\frac{1}{4}$  E., and are 283 yards apart. The lights are, respectively, 90 and 30 feet above high-water; both are *fixed white* lights, and they are shown from half-flood to half-ebb, or while there is 9 feet in the channel. A *black* ball is shown by day from the lower lighthouse, and also at the pile lighthouse, to indicate the same depth of water.

**SANDS and BUOYAGE.**—The following dangers bound the sailing track towards Fleetwood:—

**Shell Flat and Oyster Grounds.**—Shallow ground extends seaward for the whole distance between the Ribble and the Wyre; its general shape is triangular, and the depth of 5 fathoms upon its outer extremity is about 11 miles off shore.

A portion of this ground, under the name of Shell flat, has a general depth of 2 $\frac{1}{4}$  to 3 fathoms over it, the latter depth occurring with the Ribble lighthouse bearing S.S.E., distant 8 $\frac{1}{2}$  miles, and Rossall land-mark, E. by N.  $\frac{3}{4}$  N., 7 miles. The inner part of the flat, different portions of which are known as Rossall oyster grounds, Rossall patches, and Boulder banks, is shallow. The northern part of the flat, which is steep and dangerous from the shallow stony patches lying along it, forms the southern boundary of Lune deep. These patches extend from King scar to the westward for 2 $\frac{1}{2}$  miles,

to the north-western extreme of the Boulder banks above referred to, from whence they trend in a southerly direction for nearly  $1\frac{1}{2}$  mile.

On the outer North-west boulder there is barely 6 feet at low-water, and one-quarter of a mile to the southward there is a depth of only 2 feet. The six-foot rock lies with Preesall mill a little open northward of Rossall land-mark, bearing S.E. by E.  $\frac{1}{4}$  E., distant from the latter  $2\frac{1}{2}$  miles. On the highest part of the southern Boulder bank, which is nearly awash at low-water, Fleetwood high lighthouse is in line with Rossall land-mark, bearing E.  $\frac{3}{4}$  S., about 2 miles from the latter.

**Buoy.**—A red buoy with a square cage, named Shell Wharf, lies in 28 feet at low-water to westward of the North-west Boulders. Vessels bound inward must leave this buoy on the starboard hand.

To clear the outer shoulder of these banks to the southward, bring the town of Fleetwood open a little to the southward of Rossall land-mark, bearing E.  $\frac{1}{2}$  N. They will be cleared to the westward by bringing Black Comb hill in line with or open westward of Southend farm-house on Walney island, N.  $\frac{1}{2}$  E. Wyre lighthouse and King scar beacon in line, bearing E.  $\frac{3}{4}$  N., will lead between the outer boulder banks, and within Rossall patches up to the foot of King scar.

**Danger patch.**—Morecambe flat, extending from the body of the sands in the bay, forms the northern boundary of Lune deep. The southern edge of the flat is shallow, but steep-to, the inner and shoalest portions being named Fisher bank and scars, which are nearly awash at low-water springs; while farther out are Fisher bank spit and patches, one of the latter, named Danger patch, having on its southern margin a rock with only 6 feet over it at low-water. On this rock, Preesall mill is seen over the town of Fleetwood, and between the high lighthouse at that place and King scar beacon, bearing S.E.  $\frac{1}{2}$  S., distant from the latter  $1\frac{1}{2}$  mile.

Danger patch may be cleared to the north-eastward by bringing Preesall mill in line with or a little open to the north-east of Fleetwood low lighthouse, bearing S.E.  $\frac{3}{4}$  S.; and Preesall mill in line with Fleetwood church-spire, and open southward of the Mount flagstaff, bearing S.E., will clear it to the westward.

**Buoy.**—A large conical buoy, *striped vertically black and white*, with staff and cage, is moored in  $4\frac{1}{2}$  fathoms, rather more than half a mile W.  $\frac{1}{4}$  S. from the rock.

**LUNE DEEP**, the main channel into Morecambe bay, is a deep hollow between Rossall oyster grounds, and Fisher bank and patches; while the shoals bounding it have only from 3 to 6 feet upon them, their edges dip suddenly so as to increase the depth to 23 and 25 fathoms, and in one place it is 34 fathoms deep. The channel at its narrowest part is nearly

one mile wide; it extends 8 miles to the westward, and 2 miles to the eastward of the pile lighthouse, and the general course through is about E. by N.

**North Wharf** is the name of the extensive sand-flat lying to the northward of Rossall and Fleetwood. The highest part, near its northern border, is awash a little before half-ebb, and at low-water the entire flat dries out to  $1\frac{3}{4}$  mile from the shore. The north-east corner of the flat is well marked by the pile lighthouse, intended to guide vessels up to the entrance of the river Wyre, and by a *red* can buoy lying N.  $\frac{1}{2}$  E. one cable from the lighthouse; and at its north-west corner there is a rocky bank nearly half a mile in diameter, called King scar, the highest part of which, dry at half-tide, is marked by a large wooden beacon 50 feet high, and the outer point by a *red* can buoy in 3 fathoms.

King scar buoy, just referred to, lies on the line of Fleetwood high lighthouse and King scar beacon, bearing S.E.  $\frac{1}{2}$  S., distant from the latter half a mile; Wyre pile lighthouse, E.  $\frac{1}{2}$  S.,  $1\frac{4}{10}$  mile; Rossall land-mark, South; and Danger patch rock, N.W.  $\frac{1}{2}$  N.,  $1\frac{1}{8}$  mile.

**Bernard Wharf.**—The North Wharf is the western boundary, and Bernard Wharf the eastern boundary of the channel leading from Lune deep to Fleetwood. Bernard Wharf dries out at low-water for  $2\frac{1}{2}$  miles from the main, and occupies the whole of the space between the channels of the Wyre and the Lune.

The channel to Fleetwood is buoyed and beacons as follows:—

The fairway of the entrance is marked by a *black* conical buoy, lying in 4 fathoms, N. by W.  $\frac{1}{2}$  W., nearly half a mile from the pile lighthouse.

At the north-east corner of North Wharf is the pile lighthouse and a *red* buoy.

The west side of Bernard Wharf is marked by three *black* buoys; there are also two *black* buoys upon the Knott beyond, and a *chequered black* and *white* buoy on the Little Ford, all on the east side of the channel.

The western side of the channel, above the lighthouse, is marked by a *red* buoy at the outer point of the Great Ford, and also by a *red* buoy between two perches along the edge of Black scar, immediately beyond which is the steep beach under the lower lighthouse. The perches are *black*, each being surmounted by a *red* ball.

**TIDES.**—At Wyre pile lighthouse, it is high-water, full and change, at 11 h. 11 m.; springs rise  $27\frac{1}{2}$  feet, neaps  $20\frac{1}{2}$  feet, and neaps range 15 feet. At the harbour, high-water occurs one minute later, with 6 inches less rise. In the Wyre channel the first half of the flood sets to the southward or into the Wyre; during the latter half of the tide, when the sands are covered, the set is to the eastward. The set of the first half of the ebb is to the westward; afterwards it runs to the northward.

**Pilots.**—Three licensed pilots for Lune deep, and the ports within it, cruise at sea in a cutter of 25 tons, with the letter F on her mainsail. She takes up a cruising ground between Formby point and Duddon, and as far to the westward as Morecambe bay light-vessel, according to the prevailing wind. There are several powerful steam-tugs belonging to Fleetwood.

**Directions.**—Endeavour if possible to obtain a pilot, but, if forced to proceed in without one, the following directions must be carefully observed, for the land is low, the marks are few, the bottom is very irregular, and the tides are rapid.

In misty weather, and with the marks indistinct, remember that to the southward of the deep the bottom is in general white sand, and that to the northward dark sand prevails. Never shoal the water in thick weather to less than 8 fathoms.

The general sailing or fairway course up Lune deep is with Lancaster church tower, open northward of Middleton tower, bearing about E. by N.

Black Comb hill, near Duddon sands, in line with the western elbow of Walney island, bearing N. by E., clears Hilpsford bank off Walney island, and all the dangers of Morecambe bay, and crosses Shell flat in  $2\frac{1}{2}$  fathoms. Black Comb, in line with Southend farm-house on Walney island, N.  $\frac{1}{2}$  E. (View A., chart No. 1,826), clears Morecambe flats, Fisher bank patches, and the outer patches of Rossall oyster grounds in  $2\frac{1}{2}$  fathoms at low-water.

Preesall windmill, in line with Fleetwood church, bearing S.E.  $\frac{1}{4}$  E., leads outside Fisher bank patches; and Preesall mill, a little open north-eastward of Fleetwood low lighthouse, S.E.  $\frac{1}{2}$  S., leads through the swashway between Fisher bank patches and spit, in 19 feet at low-water.

The *red* buoy with a cage which lies to westward of the North-west boulders must be left on the starboard hand.

Having advanced so far up Lune deep as to be abreast North Wharf, pass to the northward of King scar *red* buoy; close Wyre lighthouse on a general south-easterly bearing, keeping clear of North Wharf by the lead; and if having to wait for the tide to enter Fleetwood, anchor to the north-westward of the lighthouse, or near the fairway buoy, in about 4 fathoms at low-water.

*Black* balls are shown by day, and Fleetwood lights at night, while there is a depth of 9 feet in the channel; but the lights in one lead over the Little Ford and Knott spit, and from 2 to 5 feet more water will be had by keeping in the buoyed channel to the westward; this track however can be pursued only by day. From Wyre lighthouse keep Fleetwood lighthouses in line, bearing S.  $\frac{1}{4}$  E., until nearing Little Ford; then pass between the *chequered* buoy on it, and the *red* buoy at the point of Great Ford, and, resuming the line of lighthouses, the higher lighthouse must be opened eastward of the low one to clear the south end of

Great Ford, and brought in line again when abreast the outer perch of Black scar; again quit the line and pass through the curved channel marked by the perches and the *red* buoy to the westward, and the two *black* buoys to the eastward, skirting the beach under the low lighthouse, and be ready to let go an anchor directly the harbour opens. Keep to the westward of the *red* mooring buoys lying in the stream.

In the direct channel a depth of about 18 feet will be carried at high-water neaps, and 25 feet at springs. Through the buoyed channel there will be about 24 feet at high-water neaps, and 30 feet at high-water springs.

**At night**, do not bring Wyre lighthouse to the eastward of E. by S. Fleetwood lights will be seen from abreast King scar. Round the pile lighthouse in not less than 3 fathoms, and run in with Fleetwood lights in line bearing S.  $\frac{1}{4}$  E., until the vessel has arrived at that point where they will appear to join, and the water quickly becomes deeper. This will be close to the beach, when hard a starboard the helm, open the harbour, and be ready with an anchor, as before directed.

**Life-Boat.**—A life-boat is stationed at Fleetwood, and a rocket apparatus at the coast-guard station.

**Fleetwood** owes its existence to the spirit and enterprise of the owner of the soil, Sir Peter Hesketh Fleetwood, who projected a railway from Preston to the mouth of the Wyre in order to the establishment of a port and the development of trade, at a time when railway communication was enjoyed by only a few of the largest towns in the kingdom. A company was formed and obtained an Act to make a railway in 1835; in 1840 the line was open for traffic. Concurrently with this improvement, the new town of Fleetwood had been rising into notice; the harbour was deepened, beacons, and lighted, and landing-stages and a pier were constructed.

Fleetwood is skirted by about 1,200 yards of quayage, furnished with steam cranes, and there are screw moorings in the harbour. A large grain elevator has been recently (1883) constructed; it forms the most conspicuous object on this portion of coast.

**Docks, &c.**—A wet dock, which was opened on the 8th October 1877, is 1,000 feet in length by 400 feet in breadth, and has an area of  $9\frac{1}{2}$  acres; the lock entrance is 250 feet long, 50 feet wide, and with  $23\frac{1}{4}$  feet water over the sill at springs; there is also a timber dock of 15 acres; the least depth of water in the dock will be 22 feet; and in the timber dock 4 feet. There is a gridiron, 260 feet long and 40 feet wide, and a 50-tons crane.

**Dock Signals.**—A *red* flag on the topmast of the dock flag-pole indicates that vessels must not approach the dock; a corresponding *red* flag will also be hoisted on the east side of the upper shore lighthouse.

A *blue flag* is hoisted half-way up the gaff at the dock when docking is about to take place; and it is shown at the head of the gaff when the gates are open.

**Trade.**—Fleetwood is connected to Preston by a railway, 20 miles; there are also, daily, steamers from and to Belfast, 120 miles. The principal foreign imports are cotton and Spanish ore; and pig iron, iron ore, and china clay, coastwise. Coal and manufactured goods are exported. The custom-house returns for the port in 1882 were:—Vessels belonging to the port, sailing, 138=16,818 tons; steam, 19=3,906 tons; Coasters, inwards, 1,191=359,606 tons; outwards, 1,169=357,919 tons; Foreign, inwards, 31=17,603 tons; outwards, 21=11,755 tons. The population in 1881 was 6,513.

**Supplies.**—Water may be obtained from a spring on the east side of the harbour, and also from the town mains.

**RIVER LUNE** has its rise near Ravenstonedale below Langdale Fell, which is elevated 2,220 feet above mean tide level, and east of the market town of Orton in Westmorland. From thence it flows in a southerly and south-western direction, passing about 2 miles west of Sedbergh and on to Kirby Lonsdale and Lancaster, 28 and 45 miles from the source; its chief tributaries being the Rawther, near Sedbergh, the Greta, and Wenning, all from the eastward. The Lune forms the port of Lancaster, which town is on the left bank, and beautifully situated on the sides of a hill crowned by a fine church, and the modern buildings of the castle, which are prominent objects from the entrance of the bay. From Lancaster the river expands into a winding estuary, issuing into Morecambe bay between Sunderland and Cockersand points, 7 miles below the town; and then, confined between sands which dry at low-water, the stream of the Lune,  $4\frac{1}{2}$  miles lower down, effects a junction with Lancaster sound and Lune deep.

**LIGHTS.**—**Lune Lighthouses**, built in 1847, stand, one on Cockersand promontory, and the other, called the Abbey, on Plover scar, at the junction of the estuary with Morecambe bay; they are E. by S.  $\frac{1}{4}$  S. and W. by N.  $\frac{1}{4}$  N., 83 $\frac{1}{2}$  yards from each other, and are visible between the bearings N.E. and S.  $\frac{1}{2}$  E. The upper light, which is on the promontory, is in a wooden structure, 54 feet above high-water; the lower light is in a stone tower, on the scar, and is 20 feet above high-water; the lights are *white* and *fixed*, and are shown while there is a depth of 8 feet in the channel.

**SANDS and BUOYAGE.**—The outfall of the Lune is between Bernard Wharf, Preesall, Pilling, and Cockerham sands upon the south, and Sunderland Shoulder upon the north. These all dry at low-water, and, collectively, form one broad foreshore through which the river winds in

many shallow and irregular channels. The highest parts of the sands are from 16 to 23 feet above low-water.

The deepest water in the channel of the Lune up to Sunderland Hole (the anchorage between Sunderland and Chapel points), is marked by 5 *black* buoys. No. 1, the north-west or fairway buoy, is a large *black* nun, lying in 7 fathoms, at the junction of Lune deep, E.N.E.  $1\frac{1}{2}$  mile from the fairway buoy of the Wyre; then the bearings in succession of the various buoys are as follows:—No. 1 to No. 2, E. by S.  $\frac{1}{4}$  S., nearly three-quarters of a mile; No. 2 to 3, E.  $\frac{3}{4}$  S., three-quarters of a mile; No. 3 to 4, E.S.E., nine-tenths of a mile; No. 4 to 5, S.E. by E.  $\frac{1}{4}$  E.,  $1\frac{1}{4}$  mile; and No. 5 to Plover scar lighthouse, E.  $\frac{3}{4}$  S., nine-tenths of a mile.

Abbey Hole is the only place within the sands barring the entrance to the river Lune where a vessel of 10 feet draught can lie afloat at low-water, and this anchorage is dangerous, especially near spring tides, from the strength of the stream as well as the loose yielding nature of the bottom, which is mostly fine sand.

**Directions.**—Being in Lune deep abreast Wyre pile lighthouse, and with Lune deep fairway mark on, proceed on that line until the fairway buoy of the Lune has been sighted, or the Lune lighthouses are in line, then continue on from buoy to buoy until abreast No. 3; No. 4 buoy must be passed having it on the starboard side, No. 5 buoy on the port side, and Plover scar lighthouse on the starboard side. If it be desired to anchor in Abbey Hole, the vessel must be moored; drop one anchor in 16 feet on the line of the lighthouse and Sunderland point, distant from the former three-quarters of a cable; and the other anchor up the stream on a line of direction just within the inner lighthouse, in 14 feet at low-water. Vessels should, however, if practicable, avoid the necessity of stopping here or elsewhere in the Lune below Glasson dock; near the entrance of which is a strong pile staging for securing vessels to, and where they may take the ground safely in an upright position.

A *black* buoy marks the bar between Abbey and Sunderland Holes, on the edge of the scar off Chapel point is a perch, and the deepest part of the channel within the river is marked out by buoys, but as the difficulties of the navigation are almost insurmountable to a stranger, it would be useless to describe them here.

**By night,** when the Lune lights are seen, a depth of 8 feet in the channel may be reckoned on, and on the line of the lights not less than 6 feet will be found at half-tide. The lights in line, bearing E. by S.  $\frac{1}{4}$  S., leads a little to the southward of the fairway buoy, vessels entering the river should, therefore, open the inner light a very little to the northward of the outer light. On arriving abreast No. 3 buoy, the inner light should be opened to a greater distance, and kept so until No. 4 buoy has been passed.



Midway between Nos. 4 and 5 buoys, the lights should again be brought in line; abreast No. 5 buoy, the inner light should be seen to the southward of the outer light, from which position steer direct for the latter until within one cable and a half of it, then pass to the northward of it at the distance of half a cable, and enter the river.

**TIDES.**—It is high-water, full and change, at Glasson dock, at 11h. 16m.; springs rise 20 feet, and neaps 14 feet. At Lancaster, it is high-water at 11h. 16m.; springs rise  $8\frac{1}{2}$  feet, and neaps 2 feet. The duration of the flood stream is about two hours, and a high spring tide flows over the weir at Skerton.

**Glasson Dock**,  $1\frac{1}{4}$  mile above Sunderland Hole, is in connection with the basin of Lancaster canal. The dock is 500 feet long, by about 200 feet wide, having entrance gates of 35 feet, with a depth over the sill at springs of about 20 feet, and at neaps 14 feet, or a little in excess of that given in the Liverpool tide tables. The lock connecting it with the canal basin is 100 feet long and 26 feet wide; and there is also a graving dock attached, of the following dimensions; length over all, 197 feet, length on blocks, 184 feet, width of entrance, 35 feet.

There is a curved breastwork of wood along the west side of the approach to the entrance lock, and a bright light on the east side of the latter is shown at tide-time.

The trade is principally coasting, with an import of timber from the Baltic, and America.

Glasson dock is a creek of Lancaster custom-house.

**Lancaster.**—This ancient borough, county town, and port, is situated on a rising ground upon the south bank of the Lune. The river a little above the town is crossed by a stone bridge of five arches to the suburb village of Skerton, and one mile farther up by a magnificent aqueduct of five semi-circular arches, 70 feet span, and 51 feet high, which conveys over the Lancaster canal. Below the bridge there are two viaducts, one for the railway to Carlisle, 90 miles, the other to Poulton,  $3\frac{1}{2}$  miles. Lancaster is also connected by the North-western railway to Leeds, 66 miles, and to Preston,  $21\frac{1}{2}$  miles.

There are both silk and cotton manufactories, foundries, and ship building to a small extent. A few vessels are engaged in the coasting trade. The custom-house returns for 1882 were:—Vessels belonging to the port, 67=10,275 tons. Coasters, inwards, 636=78,395 tons; outwards, 639=81,489 tons; Foreign, inwards, 13=5,938 tons, outwards, 12=5,568 tons. The population in 1881 was 20,724.

**Heysham Lake** is a deep channel formed between the sand-banks called Sunderland Shoulder and Clark Wharf, the entrance to which lies



off the entrance to the river Lune; a narrow gutter, with from 2 to 6 feet in it at low-water, connects its north-eastern end with Grange channel.

**GRANGE CHANNEL** lies between Clark Wharf sand on the south-east and Yeoman Spit and Wharf to the north-west. The highest part of the former sand near its north-eastern end dries 12 feet, the eastern portion of Yeoman Wharf has a height of 15 feet, and the western part about 9 feet, at low-water. The depths in this channel are subject to considerable variation, particularly near its south-western entrance, which is not more than one-quarter of a mile in width, with a depth not exceeding 2 fathoms at low-water; within the entrance the channel somewhat widens and the depths increase to  $2\frac{1}{2}$  and 3 fathoms for about 3 miles, and off the north-east end of Clark Wharf is a long narrow hole with upwards of 6 fathoms. From the end of Clark Wharf the channel gradually sweeps round to the northward and eastward of Koot-end and Old scars. On the north-west side of the latter scar is a *black* perch.

**LIGHT-VESSEL.**—A light-vessel is moored on the north-west side of Grange channel, about  $1\frac{1}{2}$  mile within the entrance, in 17 feet at low-water. She is painted red, with “Morecambe” in white letters on her sides, carries one mast surmounted by a ball, and exhibits, from an elevation of 30 feet, a *fixed red* light, which is visible at the distance of 5 miles; also, while there is not less than 8 feet depth in the channel leading to the harbour, a *fixed white* light, in addition, is shown at the bow by night, and a black ball is hoisted on a flagstaff by day.

**Fog Signal.**—In foggy weather or snow, a bell is sounded *every twenty seconds*.

From the light-vessel, Wyre lighthouse bears S.W.  $\frac{3}{4}$  S.,  $4\frac{1}{2}$  miles; Walney lighthouse, N.W. by W.  $\frac{1}{8}$  W.,  $6\frac{1}{2}$  miles; Morecambe outer pier-head, E. by N.  $\frac{3}{8}$  N.,  $5\frac{1}{10}$  miles; No. 1 red buoy, S.W.  $\frac{1}{4}$  S.,  $1\frac{1}{2}$  mile; No. 1 black buoy, S.W. by W.,  $1\frac{1}{2}$  mile; Danger patch buoy, S.W. by W.  $\frac{3}{4}$  W.,  $5\frac{9}{10}$  miles; No. 2 black buoy, N.E.  $\frac{1}{2}$  E.,  $1\frac{3}{10}$  mile; and No. 2 red buoy, N.E. by E.  $\frac{3}{4}$  E.,  $1\frac{7}{10}$  mile.

**Buoyage.**—At the western or outer extremity of Clark Wharf, is a *red* conical buoy, No. 1, in 10 feet, bearing N.N.E.  $\frac{1}{8}$  E. 3 miles from Wyre pile lighthouse. The south-west extreme of Yeoman spit is marked by a *black* conical buoy, No. 1, which lies in 12 feet, N.N.E.  $\frac{1}{2}$  E.,  $3\frac{1}{4}$  miles from Wyre pile lighthouse, and 3 cables N.N.W.  $\frac{1}{4}$  W. from No. 1 red buoy. These two buoys mark the entrance of Grange channel, which, to the north-eastward of the light-ship, is further distinguished by a *black* buoy, No. 2, lying in 6 feet, on the north-west side of the channel; and a *red* buoy, No. 2, lying in 22 feet north-west of a 10-foot bank near the south-east side of the channel. A *red* buoy, carrying a small bell, is on

the south-east side of the channel, near the north-east extreme of Clark Wharf, in 5 fathoms, E.N.E.,  $1\frac{4}{10}$  mile from No. 2 red buoy, and with Morecambe pier light, open a little southward of Old scar beacon, bearing East. A *red* buoy, No. 4, is placed on the north-east extreme of Old scar, about  $1\frac{1}{4}$  cable north-east of the beacon; and a *black* cask buoy marks the north side of the channel leading from Grange channel to Morecambe harbour, about 4 cables W.N.W. from the pier-head light.

The entrance of the channel to Morecambe harbour is one mile N.E. by E. from the bell buoy, and, on what is termed the bar, which is W. by N.  $\frac{3}{4}$  N.,  $1\frac{1}{2}$  mile from the pier-head light, there is one foot depth at low-water; and a middle-ground, to southward of the black cask buoy, dries. The channel south of the middle-ground has then only 2 to 3 feet in it, but abreast the pier is a small pool with from 3 to 4 feet.

**Anchorage.**—The best open anchorage in Morecambe bay is undoubtedly Heysham lake, for the peculiar formation of the banks there shuts out much of the tide from half-ebb to half-flood, and near low-water the stream is almost slack. In consequence of this peculiarity, during south-westerly gales when the ebb stream is running out against the swell, and throwing up a dangerous breaking sea in other parts of the bay, there is comparatively smooth water, such as any well-found ship would ride in comfortably; moreover, there is plenty of room in Heysham lake, and it is so easy of access that a pilot is not required.

Anchor near mid-channel well within the entrance of the lake in 6 to 4 fathoms at low-water. A good mark by which to know when within the limits of the best anchorage is, Rossall land-mark, in line with Wyre lighthouse, bearing S.W.  $\frac{1}{2}$  S.

In Grange channel, fair anchorage may be obtained in  $3\frac{1}{2}$  fathoms about 4 cables south-east of No. 2 *black* buoy. Good anchorage may also be found in 6 and 7 fathoms south-west and west of the bell buoy; and it is convenient to vessels desirous of communicating with Morecambe harbour. At spring tides, however, the stream is very strong.

**Morecambe Harbour** is situated on the south-east side of Morecambe bay, at the west end of the town of that name. It is formed by the projection of two piers in a northerly direction for 1,000 feet, and 400 feet apart, over Ring scar. The western pier is of stone, the other on wood piles. There is also a handsome iron pile promenade pier, 900 feet long, at the distance of nearly one-third of a mile to the eastward of the harbour, springing from near the centre of the esplanade fronting the town. The ends of these piers are barely dry at the lowest tides, and there is then 4 feet of water in the channel immediately off them, but all access to this part from the sea at such times is cut off by a shallow sand-bar more than one mile below the harbour.

The roads commanding the approach to this harbour are continually shifting and the Midland Railway Company, to whom it belongs, regulates the conveyance accordingly.

Morecambe pier forms the north-western terminus of the Midland Railway. It is connected by rail with Lancaster, distant 3 miles, and with Huddersfield on the south line. There is daily direct communication with the Lake district and the North, as well as with the manufacturing towns to the southward, and the ports on the east coast. Steamboats sail daily to and from Belfast, and from Londonderry, direct, twice a week. There are besides, during the summer season, numerous excursion steamers daily to Blackpool, Fleetwood, and Piel. The town of Morecambe now includes the old watering village formerly called Poulton. The new part of it is well-built, and has some handsome terraces of houses fronting the sea. During the summer season the place presents a gay and attractive appearance, which is increased in no small degree by the very pretty country in the immediate neighbourhood, as well as by the fine views of the mountains of Cumberland in the distance.

**LIGHTS.**—A fixed light is shown from the extremity of the western (Poulton) pier, it is elevated 48 feet above high-water, and is visible at the distance of 8 miles. At the pier heads there are gas lights coloured *green* to the westward, and *red* to the northward; and two *red* lights, one about 130 yards from the end of the stone pier, and the other nearly one cable from the end of the wooden jetty, when in line lead over the inner bar, and between the *red* and *black* buoys. At the outer end of the promenade pier a light is also exhibited, which shows *blue* seaward and *red* towards the harbour.

**TIDES.**—It is high-water, full and change, at Morecambe harbour, at 11h. 26m.; springs rise 27 feet, neaps 21 feet, and neaps range 16 feet.

**Directions.**—From a position about one mile north of Wyre lighthouse steer N.E.  $\frac{1}{2}$  N., allowing for the tide, until Morecambe light-vessel appears in line with No. 1 black buoy, bearing N.E. by E., then proceed with it on that bearing, passing close to south-eastward of the black buoy, and, leaving the light-vessel on the port hand, continue on between buoys No. 2 black and No. 2 red, pass about one cable to north-westward of the bell buoy, and then steer north-east for three-quarters of a mile, when Morecambe harbour leading (*red*) lights\* in line, bearing E. by S.  $\frac{1}{2}$  S., will lead across the bar and between the red buoy on the south side and the black cask buoy on the north side of the channel. In light winds, sailing vessels must guard against being swept to the northward by the

\* The lighthouses are not well defined objects by day, but, as above stated, they are situated about 130 yards within the pier-head.

flood tide when approaching the bar. Vessels lie aground at Morecambe pier, and are well sheltered from the most exposed quarter, the north-west, but in strong north-easterly winds good off-fasts are required to keep vessels from grinding against the pier when the tide is in.

The estuary above Morecambe harbour extends 8 miles to the railway viaduct, and is about 5 miles broad between Humphrey head and the outlet of the Keer; it is entirely occupied at low-water by Lancaster and Miln-thorpe sands, through which the following rivers or streams wind in shallow channels:—The Keer, from a little north of Carnforth; the Kent and the Gilpin, which unite three miles above the viaduct; and the Winster, from the north shore near Grange.

The embankment and viaduct over Miln-thorpe sands is above 2 miles in length, the latter or central portion being supported upon iron piles for a distance of 1,550 feet, the boat channel being under the eastern end.

From the village of Hest bank there is a road across the sands at low-water to Kent bank on the Furness side, and a guide is appointed to conduct strangers along the best track.

**ULVERSTON CHANNEL**, upon the north-west side of Morecambe bay, is formed by the Leven, the water of which flows from out lake Windermere 12 miles above the railway viaduct, and by a tortuous and shifting channel to the westward of the extensive sand called Cartmel wharf, and between Furness bank to the south-east, and Mort bank and flat to the north-west, effects a junction with the sea  $14\frac{1}{2}$  miles beyond. The lower portion of the channel is marked by two *black* buoys. The passage is discernable in daylight from the colour of the water, and at four hours flood there is sufficient depth over the sands towards Ulverston for a vessel drawing 12 feet. There are no licensed pilots, but men who know the channel may generally be met with at Piel harbour.

The channel, as before remarked, is very shallow and crooked, but it is generally marked by 5 buoys and 6 perches, which are maintained by the canal company.

**Ulverston Canal**, connecting Ulverston with Morecambe bay, is  $1\frac{1}{4}$  mile long and averages 70 feet in width, with a general depth of 12 feet. The entrance lock is 108 feet long and 27 feet wide, and opens into a small basin of one acre. At high spring tides there is a depth of 14 feet through the lock, and 8 feet at neaps. The lock is covered by a western pier, at the head of which a light is shown towards high-water of dark nights. This canal is now crossed by the Furness railway, 150 yards below the town, and only vessels with lowered masts can pass above it.

About a dozen small vessels belong to the place, and the trade consists chiefly in the export of iron ore to Scotland and Wales.

Ulverston is a parish of 10,001 inhabitants, who are employed chiefly in the cotton manufactory; it is connected with Lancaster by rail of 26 miles, which rounds the head of the bay, crossing the rivers Leven and Kent on long viaducts; and with Barrow and Whitehaven; there is also a line of 8 miles to Newby bridge near Windermere.

The monument erected on Hoad hill over Ulverston, to the memory of the late Sir John Barrow, secretary of the Admiralty, who was a native of the place, is, from its standing 417 feet above high-water, a very prominent object from every part of Morecambe bay. (View on chart 1826).

**PIEL HARBOUR** is, when the tide has well flowed, the safest and easiest of entry of all the harbours within the limits of Morecambe bay. It is in the north-west part of the bay, and formed by the south end of the channel which separates Walney island from the mainland. Walney lighthouse, and the ruined castle on Piel island within, are conspicuous objects.

The harbour is  $1\frac{1}{4}$  mile within Walney lighthouse, the point off which is a steep beach of shingle, but foul ground dries out one-third of a mile from the south point of Piel island, for  $1\frac{1}{2}$  cable from its northern point, and for a cable on its east side. On the east and north-east sides of the harbour are Foulney and Roe islands; the latter is now connected by a causeway with the main, and is the terminus of a branch of the Furness railway. The approach to the harbour is bounded by Walney island to the north-west, off which is Hilpsford bank and spit, and to the south-eastward by Mort patch, scar, and flat, and within by several patches of boulders which are awash at low-water, and by the scars which lie out from Foulney island. Mort scar, which is a mass of stones and mussels, is the outermost danger and dry at low-water; it is S.  $\frac{1}{2}$  E.  $1\frac{3}{4}$  mile from Walney lighthouse. Hilpsford bank and spit, having less than 6 feet on them at low-water, also lie out more than three-quarters of a mile south-west from Walney point.

**Piel Bar** is a broad flat connecting the south end of Walney with the foul ground lying out from Foulney island; it is nearly three-quarters of a mile across to the lighthouse beach end, having from 3 to 5 feet over it at low-water springs; the narrow channel within has from 20 to 6 feet, and afterwards upwards of 30 feet in the anchorage. The Furness Railway Company (the proprietors of the docks at Barrow) have dredged a channel through the bar 66 yards in width, and having a depth of  $9\frac{1}{2}$  to 10 feet at low-water of ordinary springs.

**LIGHTS.—Walney Lights.**—Near the south-east point of Walney island, is a stone tower 60 feet in height. The light shown from it, at 70 feet above high-water, is a *revolving white* light, which attains its

greatest brilliancy *every minute*, and in clear weather should be visible from a distance of 13 miles.

A *fixed red* light is shown from a post S.E. by E.  $\frac{3}{4}$  E. 440 yards from the lighthouse; it is at the extreme south-east part of the beach just within high-water mark, and 50 yards from the low-water margin, and is visible seaward between the bearings east, through north, and south-west; it is very useful to vessels rounding into Piel harbour.

**Caution.**—Flashing lights from the chimneys of Hindpool iron-works, north of Barrow, can be seen from the direction of Walney light, and from the westward over the island at a distance of 15 miles and upwards in clear weather.

**Piel Light** is *red*, excepting in a S.S.E. direction and to the north-westward, on which lines narrow sections of bright light indicate approximately the centre of the channel.

**Pile Lighthouse.**—A small screw pile lighthouse, showing a *fixed white* light at 26 feet above high-water, is placed on the eastern side of the channel from Piel anchorage to Barrow docks; the light is visible between the bearings N.W. by W., through north and east, to S.  $\frac{1}{4}$  W.

**Leading Lights.**—The channel through Piel bar and up to the pile lighthouse is indicated by leading lights, numbered 1 and 2, on the south-east side of Foulney; a second set, numbered 3 and 4, near Rampside; and a third set, numbered 5 and 6, on the west side of Walney channel opposite the dockyard and Ramsden dock entrance; the front or outer light of each set, bearing an odd number, is exhibited from the summit of a piled structure diagonally boarded and painted red; the back lights are each shown from the summit of a square red brick column, the face of which is of white glazed bricks. The lights are gas lights and burn night and day.

**BUOYS.**—**Hilpsford bell buoy**, painted black, with a perch and ball, and marked "Hilpsford" in white letters, lies in 14 feet, W.S.W.  $2\frac{1}{3}$  miles from Walney lighthouse, and about  $\frac{3}{4}$  mile S.W. from a depth of six feet on Hilpsford spit; from it, Rossall land-mark appears open north of Danger patch buoy, bearing S.S.E.  $\frac{1}{8}$  E., the latter  $5\frac{1}{2}$  miles distant; Morecambe bay light-vessel is W. by S.  $\frac{1}{4}$  S.,  $12\frac{1}{2}$  miles; and No. 1 black buoy, S.E. by E.  $\frac{1}{4}$  E., rather more than half a mile.

**No. 1 black buoy**, with staff and lamp cage, lies in 18 feet, with Walney lighthouse bearing N.E. by E., distant  $2\frac{1}{10}$  miles; Hilpsford bell buoy, N.W. by W.  $\frac{1}{4}$  W., rather over half a mile; and Elbow buoy, E.N.E., nearly 2 miles.

**Elbow buoy**, black with staff and cage, lies in 6 feet, with Walney lighthouse bearing N. by W.  $\frac{1}{4}$  W., distant 4 cables; and No. 2 leading light, just open northward of No. 1 leading light, N.E. by E.  $\frac{3}{4}$  E.

**Foulney Twist.**—A *black* buoy, named Foulney Twist, lies in 15 feet  $1\frac{1}{2}$  cable to the eastward of Foulney spit.

**Seldom Seen.**—On the east side of the entrance to Piel harbour is a large *red* buoy moored about one-quarter of a cable south of the Inner boulder, or Seldom Seen bank, the highest stone of which dries one foot at low-water. This buoy lies with Walney lighthouse in line with the light pole on the outer part of Hawes point, and is distant over one cable from the low-water beach.

A *black* and *white vertically striped* buoy is moored on the summit of the bank extending from the east side of Piel island.

A *black* buoy marks the end of the stony ridge at the north-east point of Piel island, and a second *black* buoy is placed at the next projection of the bank one-quarter of a mile above.

**Elbow.**—A large *black* buoy with a cage, marked Elbow buoy, is moored at the bend in Walney channel opposite the pile lighthouse.

The channel above Piel is marked by *red* buoys on the starboard side entering, and by *black* buoys on the port hand, and is kept dredged to a depth of 32 feet at high-water springs up to the entrance of Ramsden dock, and six feet less depth up to Devonshire dock entrance. The buoys are occasionally shifted as alterations are effected by the dredging operations now in progress.

**Pilots.**—There are ten Trinity branch pilots who reside on Piel island. They cruise in small schooners between the bar and Morecambe bay light-vessel. On the mainsail of each vessel is the letter B. and her number. Fleetwood pilots may conduct vessels to Piel.

**Steam-tugs** are always in attendance. A vessel requiring the services of a tug should hoist her ensign at the main.

Piel is in telegraphic communication with the harbour office at Barrow.

**TIDES.**—It is high-water, full and change, at Roe island, at 11h. 5m.; springs rise 28 feet, and neaps 21 feet; the strength of both flood and ebb is about  $3\frac{1}{2}$  knots.

**Directions.**—Large vessels having to lie-to while waiting for sufficient water to enable them to cross the bar must be careful to keep well westward of Hilpsford bell buoy and not reduce the depth under 5 fathoms, as there are many shoal patches extending in all directions from the buoy. Approaching Piel harbour from the south-west, should the weather be misty, make Walney lighthouse on an E.N.E. bearing, which will lead up to the bell buoy; passing it close to on either side, steer E.S.E. (allowing for the tide) which will lead up to No. 1 *black* buoy, pass to southward of that buoy, and continue the same course for about one-quarter of a mile,

then bring Foulney lights in line, bearing N.E. by E.  $\frac{1}{2}$  E., which will lead up the channel to the Elbow buoy, when the leading lights at Ramp-side must be brought in line, bearing N.N.E.  $\frac{1}{2}$  E. (the turn at the Elbow is very sharp), and with this mark proceed up the inner channel and on to Piel harbour. Hawes point having a tendency to advance to the eastward, it is desirable when closing it, should the vessel be of heavy draught, to just open the lights to the eastward, and, as soon as the point has been passed, open them slightly the other way for a distance of about two cables, then bring them again in line, and when abreast the black and white vertically striped buoy, proceed to Piel harbour and anchor with Piel castle bearing S.W. by S. to W.S.W. in from 12 to 25 feet, the deepest water being to the northward above a large mooring buoy.

If proceeding above Piel harbour, when abreast the black and white vertically striped buoy, haul gradually round to northward and bring Walney channel leading lights in line, bearing N.W.  $\frac{1}{2}$  N., which will lead up between the red and black buoys and to abreast the pile lighthouse when haul up to N. by W.  $\frac{3}{4}$  W. and proceed up the channel to the docks.

**At Night,** Walney light should not be brought to northward of N.E. by E., nor should a vessel approach at low-water into a less depth than 5 fathoms. As soon as the tide is suitable Foulney leading lights may be brought in line, bearing N.E. by E.  $\frac{1}{2}$  E., remembering that this passes just clear to eastward of Lightning rock on which there is 9 feet at low-water springs.

When the dredger is moored in the vicinity of the channel on or outside the bar, she exhibits four lights, and vessels should pass her on that side from which *two* lights placed *vertically* are shown.

**Caution.**—Care must be taken in approaching Piel harbour towards the period of spring tides, for the stream of both flood and ebb sets across its entrance. A stranger, compelled to enter without a pilot, should wait until last-quarter flood, and not attempt to enter after first-quarter ebb.

Small vessels generally lie aground on the east side of Piel island.

Approaching Piel harbour from the northward after half-flood, keep Black Comb open of the west elbow of Walney island, N. by E.  $\frac{1}{2}$  E., to clear Hilpsford bank, and round the bell buoy with Walney lighthouse bearing E.N.E., when proceed as before directed.

**Life-Boat.**—A life-boat is stationed on Roe island.

The South or Walney channel, leading from Piel harbour to Barrow, is now being deepened and otherwise improved by dredging.

**BARROW,**  $3\frac{1}{2}$  miles above Piel harbour, which 40 years ago was a village of about 200 inhabitants, is now a town of considerable importance,



with a population, in 1881, of 47,111. A branch connecting it with the Furness railway was formed about 25 years ago, since which extensive docks and quays have been built, and the harbour has been improved.

**Docks.**—**Devonshire dock**, which was opened in 1867, occupies, with Buccleugh dock, the space which was formerly the channel between Barrow island and the main; it has an area of 30 acres, and is connected with Walney channel by an entrance dock of  $1\frac{1}{2}$  acre, the gates of which are 60 feet wide, and have a depth over the sill of  $25\frac{1}{2}$  feet at high-water springs, and 18 feet at neap tides. Abutting on Devonshire dock are commodious warehouses, which are fitted with hydraulic cranes and other appliances for discharging and loading vessels; and on the south quay is a crane, worked by hydraulic power, which is capable of lifting one hundred tons. Within this dock is also a depositing dock.

**Buccleugh dock**, having an area of 31 acres, is entered from Ramsden dock, and also communicates with Devonshire dock, the entrances, being each 80 feet in width.

**Ramsden dock**, to the south-east of Buccleugh dock, embraces an area of 63 acres; it is approached from Walney channel by an entrance basin of 8 acres, 900 feet long, and a lock of the same length; the entrance is 100 feet wide, with a depth of  $31\frac{1}{2}$  feet on the sill at high-water of ordinary springs, and 24 feet at neaps. There is 24 feet depth of water maintained in the dock, and 6 feet more depth of water in the basin and lock, which have several crane berths for lightening and loading up heavy draft vessels. Commodious sheds have been erected on the dock quays throughout their whole length, besides warehouses, cattle sheds, hydraulic and steam cranes, &c.

**Cavendish dock**, of 142 acres, has an entrance from Ramsden dock of 80 feet; this dock, which is unfinished, is intended to be used as a timber float for the present.

**Depositing dock.**—A depositing dock, capable of lifting ships of 3,400 tons weight, in less than an hour, and working in conjunction with a gridiron specially built for it, is situated in Devonshire dock. By means of this dock a ship can be raised, cleaned, painted, and lowered again into the water in 24 hours.

**Graving dock.**—North-east of the channel entrance of Devonshire dock is a graving dock 500 feet long, with an entrance 60 feet in width, and having a depth of  $22\frac{1}{2}$  feet on the sill at high-water of spring tides.

**Patent slip.**—There is a patent slip adapted for vessels of 500 tons.

**LIGHTS.**—The *electric* light is used for Ramsden dock, entrance, basin, and road. A *green* light is shown at the wooden pier on the west

side of Barrow island, and another on Belfast quay above Ramsden dock entrance. A *green* light is also exhibited from the south-west corner of the pier-head at Devonshire dock.

**Signals.**—A *red* flag, by day, hoisted at the pier-head flagstaff, Ramsden dock, and a *red* light by night, indicates that the tidal gates are open.

A *black* ball under the *red* flag by day, and two *red* lights by night, signifies that the basin entrance is not clear.

Here are large iron and steel works, engine works, ship-building yards, &c., and a considerable trade has been established. The docks are in connexion with the lines north by Whitehaven, and with Lancaster by the Furness railway. Steam-vessels run daily to Belfast, and weekly to Glasgow and the Bristol channel; there is also steam communication with Rotterdam, Antwerp, Quebec, and Montreal, and in the summer months to Douglas in the Isle of Man.

Barrow custom-house returns in 1882 were:—vessels belonging to the port, 149=70,777 tons; Coasters, inwards, 2,372=479,766 tons; outwards, 2,391=506,253 tons; Foreign, inwards, 74=40,265 tons; outwards, 77=44,750 tons.

**WALNEY ISLAND** is 7 miles long in a general north and south direction, about three-quarters of a mile across at the broadest part, and the whole of it is low, the greatest elevation, 64 feet above high-water, being near the church. The church and a windmill towards the north end of the island are distinct objects. The village of Hawcoat and its tower upon a rounded hill of the mainland generally show over the island. The direction of the coast from Walney point is about N. by W. for  $2\frac{1}{4}$  miles, then North and N. by E., rounding in towards the main with a narrow point, leaving a channel of one-quarter of a mile, called the Scarf, running up towards Barrow.

**Cockspeck Scar.**—Foul ground extends generally off the sea face of the island for one mile, and 7 feet upon Cockspeck scar, lying abreast the church, will be found at that distance from the land. Wyre pile lighthouse, kept open of the south-west point of Walney, bearing S.S.E.  $\frac{1}{2}$  E., will clear it to the south-westward in 15 feet at low-water.

**DUDDON RIVER** has its source about 6 miles west of Ambleside, in the valley between Langdale and Furness Fells, and near the junction of Westmorland, Cumberland, and Lancashire, forming the boundary of the two latter counties from its source to its confluence with the sea, a distance of about 28 miles. At Boughton-in-Furness it expands into what is termed Duddon-mouth, up to which point the estuary is navigable; and eleven miles lower down, the river, after many windings, joins the sea between

Walney and Haverigg. A little below Boughton the estuary is crossed by the Whitehaven and Furness railway upon a wooden viaduct 400 yards long, and having 49 openings.

The entrance of the Duddon is beset by sand-banks, and is so changeable as to be only fit for small vessels. The bar, which is N. by W.  $\frac{1}{2}$  W.  $7\frac{1}{2}$  miles from the south-west point of Walney island, is marked within by a red nun buoy, and the channel inwards by black buoys. The Scarf channel flows round the north end of Walney and on to Barrow, affording 14 feet at high-water springs, but it is used only by small vessels; the Duddon or main channel runs towards Haverigg in a general N.E. by E. direction, and afterwards winds tortuously through the broad sandy estuary.

To clear all the outlying sands bounding the entrance of the Duddon, keep Wyre pile lighthouse, open of the south-west point of Walney, bearing S.S.E.  $\frac{1}{2}$  E.; and Black Comb to the eastward of N.E. by N.

**TIDES.**—It is high-water at Duddon bar, full and change, at 10h. 54m.; springs rise 26 feet, and neaps range 14 feet.

**COAST.**—North of the Duddon the coast holds without much variation about N. by W. for 7 miles to Selker and Tarn point. Black Comb, elevated 1,919 feet above high-water, is immediately to the northward of the Duddon. This mountain mass, from being near the water and of a dark colour, is a noble coast object and useful as a sea-mark; it has an unbroken rounded outline, and the hills of Lockna Banks, partially cultivated, lie a short distance to the southward of it; the whole being terminated seaward by a line of reddish cliff and brues. Black Comb is succeeded by high land in a north-east direction with a well-cultivated foreground.

**Selker Rocks.**—Rocks and shoals extend for about  $1\frac{1}{2}$  mile off-shore from abreast Black Comb; the most southern is the Black Leg, which dries 2 feet at low-water; two miles beyond is the Scala Fold Style which comes awash at the same time; this nearly connects with Selker rocks, which are  $1\frac{1}{2}$  mile outside Selker point, the south-west approach to Raven-glass, and which is 17 miles from the south-west point of Walney island. The middle of the rocks, dry at low spring ebbs, is marked by a perch  $1\frac{1}{4}$  mile from the shore. While abreast them do not decrease the low-water depth under 10 fathoms. St. Bees head light is masked from the bearing north (nearly) in toward the land, the limit of darkness covering one-third of a mile outside the two-fathoms line of soundings at Selker rocks.

**SELKER LIGHT-VESSEL**, moored in  $10\frac{1}{2}$  fathoms off Selker rocks, exhibits a double-flashing light giving one white and one red flash

in quick succession *every half-minute*, at an elevation of 38-feet above the sea. The vessel has "Selker" painted on her sides, and she carries a diamond at the masthead.\*

**Fog Signal.**—A gong is sounded in thick or foggy weather.

From the light-vessel, the pillar on Newton Knot is in line with the second saddle on mountain northward of Scar hill, bearing N.E. by E.  $\frac{1}{4}$  E.; Strawberry house is in line with the southern summit of Lockna banks, S.E. southerly; St. Bees head lighthouse bears N.  $\frac{1}{4}$  E., distant  $15\frac{1}{2}$  miles; Ravenglass railway bridge, N.E.  $\frac{3}{4}$  E.,  $6\frac{1}{10}$  miles; Selker point, E.  $\frac{1}{4}$  S., 3 miles; and Duddon bar fairway buoy, S. by E.,  $9\frac{2}{10}$  miles.

**RAVENGLASS HARBOUR.**—From Selker point, low sand-hills trend in N.N.E., 3 miles, for the entrance of Ravenglass harbour, the shore to the northward being also of the same character, and an opening of one-third of a mile affords an outlet to the waters of the three rivulets, Irt, Mite, and Esk, which have their sources near Scar Fell Pikes in Cumberland, the first from Wast water, 13 miles from Ravenglass; the second near Birnmoor tarn, 8 miles; and the third near Angel tarn, 18 miles. The entrance to the harbour may be readily known by the bounding sand-hills, which continue northward to within one mile of Seascale, an elevation of 111 feet near the coast; and the long sloping hill Newton Knot to the southward of Ravenglass, on which is a tall pillar, is a well-marked object. The entire inlet dries at low-water, through which the above-mentioned streams maintain a narrow, winding, and changeable channel.

At the entrance, near the fish-weir, which is marked by a perch bearing W.  $\frac{1}{4}$  S., three-quarters of a mile from the sea-mark upon the shore within, as well as in the channel generally, there is a depth of 3 fathoms at high-water neaps.

**Drigg Rock**, with 6 feet over it at low-water springs, lies out one mile from the shore, and  $1\frac{1}{2}$  mile to the northward of the entrance to Ravenglass.

**TIDES.**—It is high-water, full and change, at Tarn point, at 11h. 22m.; springs rise 23 feet, neaps 18 feet.

**Directions.**—To enter Ravenglass, keep 2 miles off the coast to avoid Selker rocks to the southward, and Drigg rock to the northward, until the village of Ravenglass has been brought to bear about E.N.E., when, should the flood be at the last-quarter, keep the village in that direction until the perch bears East. The mark for the bar is, the perch and sea-mark, in line with the pillar on the south shoulder of Newton Knot hill, bearing E.  $\frac{1}{4}$  N. (view D. chart 1826). Pass to the north of the perch, and steer

\* See regulations respecting light-vessels, and vessels for marking wrecks, at page 30.

E.N.E., with the village a little on the port bow, and anchor half a cable from the west end of the village, or near the perch at the confluence of the three rivulets.

In moderate weather vessels may anchor off the coast in a proper depth, as the tides are weak.

The Whitehaven and Furness railway sweeps round the estuary, passing a little within Ravenglass; the village contains about 400 inhabitants, who are engaged in oyster fishing, and have a few vessels employed in the coasting trade.

**COAST.**—From the north point of the entrance to Ravenglass to St. Bees head the coast holds in a N. by W.  $\frac{1}{4}$  W. direction for 12 miles, being recessed between the points named about one-third of a mile, along which skirts the Whitehaven and Furness railway, by the village of St. Bees; the background is mountainous, and the foreground slopes to its termination at the head. The village and college of St. Bees show plainly from abreast.

**Cochra and Barn Scars** extend three-quarters of a mile from the shore,  $1\frac{1}{4}$  mile beyond Drigg rock, and the low-water shore of sand and stones dries out towards St. Bees from one-third to three-quarters of a mile; 4 miles south of the lighthouse are the rocks known as Longman scar and Ben rock. The whole shore from abreast Drigg rock is clear at one mile off, and a depth of 7 fathoms prevails generally at that offing.

**Measured Mile.**—The Barrow Ship Building Company has laid out a mile of 6,080 feet, marked by two pairs of beacons, on the shore at Seascale about 8 miles to southward of St. Bees head.

**Life-Boat.**—A life-boat is stationed at Seascale.

**ST. BEES HEAD** (view, chart 1826), a nearly perpendicular cliff of new red sand-stone, stands out boldly when approaching it from the southward, and is exceedingly useful as an easily recognised mark for the approach to the Solway firth, of which it is termed the "Inner beacon," the Isle of Man being considered the outer one.

**LIGHT.**—A circular light-tower, 55 feet high, stands near the brink of the north extremity of St. Bees head; and its *white fixed* light, which is 336 feet above high-water, may be seen at a distance of 25 miles in clear weather. The light is masked from a nearly north bearing in towards the land, the limit of darkness covering one-third of a mile outside the two fathoms line of soundings at Selker rocks, or 2 miles seaward of Selker point.

The village of St. Bees stands on the rise near the shore, about 2 miles S.S.E. from the lighthouse; it is noted for its ancient abbey, part of which has been converted into a college.

**A Telegraph Cable** extends from below the south head of St. Bees, for  $28\frac{1}{4}$  miles to Ramsey bay, Isle of Man.

## CHAPTER VII.

## ST. BEES HEAD TO MULL OF GALLOWAY.

## SOLWAY FIRTH.

VARIATION IN 1884.

At the entrance of the Firth -  $20^{\circ} 20' W.$  | Off Sillioth -  $20^{\circ} 10' W.$ 

**SOUTH-EASTERN SHORE.**—Solway firth\* may be considered as contained to the eastward of a line passing from St. Bees head, on the Cumberland coast, to Abbey head in the Scotch county of Kirkcudbright, the latter bearing from the lighthouse N. by W.  $\frac{1}{2}$  W.,  $19\frac{1}{4}$  miles, and extending up to where the navigation now ceases, for 28 miles. A large portion of this wide and extensive inlet is occupied by sands, which will be hereafter described from page 221.

The following are the bearings and distances from the lighthouse on the North head of St. Bees, noticed in the last chapter, to some of the principal surrounding objects :—

Morecambe bay light-vessel	- S. by W. $\frac{1}{2}$ W.	37 miles.
Douglas head lighthouse -	- W. by S. $\frac{1}{2}$ S.	37 „
Bahama light-vessel and Maughold head - -	- W. $\frac{3}{4}$ S.	$23\frac{1}{4}$ — $27\frac{1}{2}$ „
King William banks buoy	- W. $\frac{1}{8}$ N.	$14\frac{1}{2}$ „
Mull of Galloway -	- N.W. by W. $\frac{1}{4}$ W.	$43\frac{1}{2}$ „
Burrow head -	- N.W. $\frac{1}{4}$ W.	$28\frac{1}{2}$ „
Little Ross lighthouse -	- N.N.W. $\frac{1}{4}$ W.	22 „
Abbey head -	- N. by W. $\frac{1}{2}$ W.	$19\frac{1}{4}$ „
Two-feet bank perch buoy	- N. $\frac{1}{4}$ E.	$12\frac{1}{10}$ „
English channel fairway buoy	- N.N.E. $\frac{3}{4}$ E.	15 „
Workington lighthouse -	- N.E. $\frac{1}{8}$ N.	$8\frac{1}{2}$ „

**SALTOM BAY.**—From the North head of St. Bees the coast trends easterly and then north-easterly for  $2\frac{3}{4}$  miles to Whitehaven, forming Saltom bay, named from some extensive coal pits near high-water mark three-quarters of a mile to the westward of Whitehaven. For one mile from St. Bees the cliffs are of sandstone with several quarries in them; then both the elevated back-land and the shore descend gradually. Saltom

\* See Admiralty chart, England, west coast, firth of Solway, No. 1,346; scale,  $m = 1.0$  inch.

bay, which is skirted by oyster grounds, affords good anchorage in south-easterly winds. The depths in approaching Whitehaven are regular, and anchorage may be taken up with the entrance bearing about S.E. by E., half a mile distant, in 5 or 6 fathoms, sand.

**WHITEHAVEN** has a tidal harbour enclosed by piers, which affords excellent shelter in all winds; it is divided into the outer, inner, north, and south harbours, and custom-house dock, which represent the various additions that have been made from time to time. The outer harbour is contained between West pier (a noble structure) and North pier, and it is divided from the other enclosed spaces by the Old quay to the westward and the jetty to the eastward; then the several inner harbours are divided from each other by the quays named the Sugar Tongue, the Lime Tongue, and the Bulwark.\*

**Dock.**—In the North harbour there is a wet dock of  $4\frac{1}{2}$  acres, with an entrance 50 feet wide, and a depth of 18 feet at high water of spring tides.

**Patent Slip, &c.**—There is a patent slip at the head of the custom-house dock adapted for vessels of 300 tons, and a gridiron 150 feet in length; also a building yard for the construction and repair of iron ships.

**LIGHTS.**—Several lights are shown from the piers both for coasting and tidal purposes. The *white* light, on the west pier-head, is 52 feet above high-water, *revolves every two minutes*, and is exhibited all night; it is visible at the distance of 11 miles in clear weather. A *fixed green* light is shown from the head of North pier, S.E. by E.  $\frac{1}{4}$  E. 200 yards from the outer light. A *fixed red* light is shown from near the end of the Old quay from half-flood to half-ebb; the *red* light bears S.S.E.  $\frac{1}{4}$  E. 450 yards from the *revolving* light. By day, the same depth is indicated by a *red* flag at the head of the Old New quay.

**Caution.**—The numerous iron-works along this coast are liable to bewilder a stranger, and they at times quite throw the harbour lights into the shade; the lights from these works are particularly vivid in an E.N.E. direction from St. Bees college, and between Whitehaven and the head.

**Fog Signal.**—For the purpose of guiding vessels into the harbour during thick or foggy weather, a steam whistle on the west pier-head at Whitehaven gives blasts of *five seconds* duration *every half-minute*.

**TIDES.**—At Whitehaven, it is high-water, full and change, at 11h. 14m.; the tide rises on equinoctial springs 28 feet, on ordinary springs 26 feet, and at neaps 19 feet. The flood and ebb streams continue to run past the harbour until one hour after high and low water, respectively, by the shore. About one mile off St. Bees head the stream runs for 9 hours to the southward, turning the last hour flood, and running north-east until 2 hours after high-water. Five miles off the head the streams set about

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\* See Admiralty plan of Whitehaven, No. 1,775; scale,  $m = 20$  inches.



S.E. by E. and N.W., the rate of the first, or the flood, being one knot, and of the ebb three-quarters of a knot.

**Pilots.**—Harbour pilots are always on the look out, and are to be procured by hoisting the usual pilot-signal. The charge is by agreement.

There are no licensed pilots for Solway firth except at Maryport, but persons acquainted with the navigation may be found at Whitehaven.

**Steam-tug.**—There is a steam-tug attached to the harbour, for which the signal is an ensign or union jack at the main top-gallant masthead by day, and two lights vertically by night.

**Time Signal.**—A ball is dropped daily (except Sundays and general holidays) at 10h. 0m., Greenwich mean time, from a staff surmounting Sutton's clock, Lowther street.

**Directions.**—The harbour nearly dries throughout at low-water springs, but small vessels may enter at early tide, and at low-water neaps will lie afloat within the western pier-head. Vessels drawing 18 feet may enter at high-water springs, and those of 14 feet draught during neaps.

In entering, keep close to the west pier-head, as the flood stream sets to the eastward across the harbour's mouth; then steer S.E. by S. for the opening between the jetty and the Old quay-head, where the tide-light stands; here the vessel's way must be checked by a warp, or, that failing, let go an anchor in the inner harbour immediately the Old quay-head has been passed, and then berth the vessel as convenient.

**Caution.**—So long as a vessel is manageable, and there is sufficient water, she may enter Whitehaven, even in a heavy gale, but with scant winds it is necessary to keep lofty canvas set, and to hug the west pier-head closely until well within it, for a heavy sea is thrown across the entrance in westerly and W.S.W. gales, and many accidents have at such times occurred from vessels not observing the above precautions; and being also influenced by the flood stream, they have not unfrequently missed the entrance, and become stranded behind North pier. If forced to run ashore under such circumstances, keep as close as practicable to the back of North pier, as there is less sea there, and the vessel is more within reach of assistance.

**Life-Boat.**—There is a life-boat stationed within the harbour, and also rocket apparatus.

**Supplies.**—Excellent water is led down to all the quays, and supplied at a moderate charge. Other supplies are plentiful.

Whitehaven is a parliamentary borough; its chief trade consists in the exportation of coal, which is extensively worked in the immediate vicinity; also lime, freestone, and iron; and in the importation of some West Indian, American, and Baltic produce, flax from Ireland, and pig iron from Wales. In the season there is also an extensive herring fishing.

There is railway communication from the south, and by Maryport to Carlisle  $12\frac{1}{2}$  and 28 miles, also to Cockermouth  $21\frac{1}{2}$  miles, and Egremont 6 miles; and steamers ply to and from Belfast, Dublin, Dundrum, Isle of Man, and Liverpool.

The custom-house returns in 1882 were as follows:—Coasters, inwards, 1,664=211,789 tons; outwards, 1,665=218,047 tons; foreign, inwards, 25=9,434 tons; outwards, 26=9,091 tons. Number of vessels belonging to the port, 100=17,156 tons.

The population in 1881 was 19,321.

The cliffy shore, fronted at low-water for a cable out by rock and stones, trends from Whitehaven in a general north-east direction for  $1\frac{1}{2}$  mile to the village of Parton, which has a conspicuous church with a square tower. The rocky foreshore renders landing here difficult about the time of low-water. From Parton to Harrington is N.E. by N.,  $2\frac{1}{2}$  miles. The railway skirts the high-water shore, and is backed by cliffs from 50 to 100 feet in height, and fronted by a low-water shore one-quarter of a mile in breadth, of the same character as before mentioned.

**HARRINGTON**, which is prominently marked by two large building sheds and some blast furnaces just to the southward of it, has a small artificial harbour, through which a beck or stream discharges its water. The harbour is defended seaward by a stone pier, which extends first W.N.W., and then N. by E., the cant being backed by two wooden groynes to retain the shingle. The harbour is contained between this pier and a jetty on the south side, and by north woodwork, and Scotch quay on the north side; these various projections divide the contained space into an outer and inner harbour, the latter furnished with coal-drops.

**LIGHT**.—At the head of the stone pier is exhibited from a pedestal a *fixed white* light, elevated about 44 feet above high-water, while there is a depth of 8 feet into the harbour; it is visible at the distance of 11 miles in clear weather; by day, a *red* drum hoisted at the inner end of the same pier indicates a like depth.

This small harbour affords good shelter with all winds, but some sea is thrown in during strong northerly gales. Vessels drawing 13 feet are admitted on springs, and those of 7 feet at neaps. In entering, keep close round the pier-head, and then steer about S.E. for the opening into the inner harbour.

**TIDES**.—It is high-water, full and change, at Harrington, at 11h. 15m.; equinoctial springs rise 27 feet, ordinary springs 25 feet, and neaps 19 feet.

Harrington is a port chiefly for the exportation of iron and coal. Iron vessels of upwards of 1,000 tons are built there. The returns of the

custom-house are included with those of Workington. In 1881 the population was 3,019.

**WORKINGTON.**—From Harrington the coast trends about N.N.E. for  $2\frac{1}{4}$  miles to the harbour of Workington, and is fronted by a stony foreshore one-fifth of a mile broad. Just to the southward of Workington pier, Chapel hill, elevated 116 feet, with a square white tower on its summit, the ruin of a chapel, is a well-marked object. On its north end is a white-washed mark, named the Hottentot kraal, having near it the massive ruined works of a pit; some very large building sheds also serve to mark the place.

**River Derwent.**—The harbour is formed by the outlet of the river Derwent, which takes its rise among the mountains at the head of Borrowdale,  $1\frac{1}{4}$  mile north-east of Sea Fell Pikes, 3,210 feet above mean level. It joins Derwentwater,  $7\frac{1}{4}$  miles from its source, issues from the north end of that lake near Keswick, and is there joined by the Greta; it then winds through a marshy plain at the south-west foot of Skiddaw for 3 miles, and enters the lake Bassenthwaite, which is  $3\frac{1}{2}$  miles long, and from thence flows on by Cockermouth, Great Broughton, and Camerton, to Workington, where  $1\frac{1}{4}$  mile below the bridge it falls into the sea; its total length, including  $2\frac{1}{4}$  miles through Derwentwater, being 36 miles.

**The harbour,** which is the property of the Earl of Lonsdale, is fronted by a stony foreshore one-third of a mile broad. That to the south of the entrance projects well out to the westward of the north shore, and from it John pier runs out in a N.W. and W.N.W. direction, from which a breakwater extends N.W. 500 feet; next within on the same side is a wooden pier, the new quay jetty, and main pier, containing between them a space named the old dry dock; afterwards is another projection called Merchants' quay, between which and the main pier is the harbour. On the northern side is Lonsdale dock, and the channel of the river is bounded to abreast the inner end of John pier by a curved rubble wall marked to the outer end by perches. Lonsdale dock is 600 feet in length by 300 feet in breadth, and contains above  $4\frac{1}{2}$  acres; the entrance gates are 40 feet wide, and over the sill there is 16 feet at springs and  $10\frac{1}{4}$  feet at neaps. There are steam cranes for loading and discharging vessels. Water is led down to the quays.

The entrance of the channel is marked by *red* buoys on the south side, and on the north side by *black* buoys and perches, the outer perch having upon it a cask painted *black*.

**LIGHTS.**—A *fixed white* light is exhibited, at 42 feet above high-water, from the head of the breakwater extending from John pier, while there is a depth of 8 feet into the harbour; this light must be left on the

starboard hand in entering. A *red* ball is hoisted by day at the heel of John pier to indicate the same depth of water.

Two *green* lights, for leading in, are shown from white towers during the same period as the tide light on the breakwater; the lower lighthouse is placed at the outer end of the timber jetty on the north side, and the upper lighthouse at the north-west end of Lonsdale dock; they bear from each other E.S.E. and W.N.W.

On the end of the Old wooden pier a *red* light is shown at tide-time.

It is at times difficult to distinguish these lights owing to the number of blast furnaces in their neighbourhood.

**TIDES.**—It is high-water, full and change, at Workington, at 11h. 4m.; ordinary springs rise  $25\frac{1}{2}$  feet, and neaps 20 feet.

**Pilots and Tugs.**—Two steam-tugs belong to the harbour; the signal for one is a flag by day, and two lights vertically at night. There are no licensed pilots, but the harbour boat is always in attendance at tide-time day and night.

**Directions.**—Workington harbour admits vessels drawing 15 feet on springs, and 9 feet on neaps. Vessels waiting tide may anchor abreast the port in light winds and settled weather.

Proceed in with the white towers, or the *green* lights by night, in line bearing E.S.E., and between the *red* buoys on the starboard hand, and the *black* buoys and perches on the port hand, until a *red* light opens on Old pier on the south side of the river, then port the helm, keeping the lower *green* light on the port side, and the *red* light on the starboard hand.

If bound for the dock, have ropes ready on the port bow and quarter for the men in attendance on the west pier.

Small craft go a considerable distance up the harbour, where they have the advantage of good wharfage.

The town of Workington is situated on the south side of the river; the lower portion is on the same level as the harbour, but the upper and principal part is on an eminence. The Derwent is crossed by a three-arched road bridge above the town, and by a railway viaduct half a mile within the entrance. The port possesses a patent slip adapted for vessels of 350 tons, a gridiron capable of taking vessels drawing 10 feet, and three large building sheds, under which vessels of 1,200 tons burden have been built. Extensive coal-pits are worked in the neighbourhood, and there are also large ironworks which furnish the chief portion of the export trade.

Besides the coast railway to Maryport, there is a line through Cocker-mouth and Keswick to Penrith, distant 39 miles. There is also a steam-vessel once a fortnight to Belfast.

The custom-house returns in 1882 were :—Number of vessels belonging to the port, 32=14,163 tons; coasters, inwards, 1,841=249,650 tons; out

wards, 1,775=239,134 tons; foreign, inwards, 2=332 tons; outwards, 2=332 tons.

The population in 1881 was 13,305.

From Workington the general trend of the coast is N.E.  $\frac{1}{2}$  E.  $4\frac{1}{2}$  miles to Maryport, the village of Flimby lying in a bight about 3 miles distant. The high-water shore is low, with rising ground half a mile in the rear. The foreshore, half a mile wide, is of loose stones and slag from the furnaces, changing to fine sand near Flimby. From hence to Maryport, the coast is of the same character, with many detached masses of stone lying outside the low-water margin; and the bottom is foul, with less than 12 feet depth, for  $1\frac{1}{2}$  mile off shore. The blast furnaces at Workington and Maryport, and the numerous tall chimneys of coal mines and other works, are conspicuous objects; at night, the lights of the furnaces have a remarkable appearance.

**MARYPORT** stands chiefly upon an eminence on the north side of the outlet of the river Ellen, a small stream which springs out of Caldbeck fells to the north of Skiddaw, and is about 23 miles in length.

**Maryport Road.**—Large vessels should anchor in 5 fathoms, with the Solway light-vessel bearing east of N.E.  $\frac{1}{2}$  N., and Maryport lighthouse S.E. by S. Within this position is a bank  $2\frac{1}{2}$  miles long, with from 17 to 14 feet over it; it is  $1\frac{3}{4}$  mile from the shore, and parallel to it, with Maryport lighthouse between the bearings E. by S.  $\frac{3}{4}$  S. and S.  $\frac{1}{4}$  W. Another bank, 2 cables long by one cable broad, with 9 to 12 feet over it, lies 8 cables N.W.  $\frac{1}{2}$  N. from Maryport lighthouse. Between these banks there is good anchorage, on stiff clay, in 4 fathoms, with the extreme of St. Bees head seen anywhere between Chapel bank point and Workington outer lighthouse, S.W.  $\frac{3}{4}$  S., and Maryport lighthouse between S.E. by S. and S.  $\frac{1}{2}$  E.

**Harbour.**—The harbour of Maryport, which is dry at low-water springs, is contained between several piers and jetties, constructed from time to time as additional accommodation was required. The south side of the entrance is bounded by a long straight wooden pier, which extends to near the low-water margin. On this side of the river there is the south pier, jetty, and south quay; between the two latter is an entrance basin, of  $2\frac{1}{2}$  acres, to a wet dock of  $3\frac{1}{2}$  acres, with an entrance 50 feet wide, and a depth over the sill of 18 feet at springs and 12 feet at neaps.\* The north

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\* Another wet dock of 6 acres, with an entrance passage 50 feet wide, and a depth on the sill of 23 feet at high-water of ordinary spring tides, and 17 feet at neaps, is being constructed parallel to and seaward of the old dock; it is expected that it will be open for traffic in the summer of 1884. Lines of rails in connexion with the main railways will be laid round the dock, which will be furnished with steam cranes and coal drops. The dock basin will have an area of  $4\frac{1}{2}$  acres, and a quay space of about 500 feet. The south and north piers are also being extended.

The depths given for the sills of Maryport docks, and the channel, are those of ordinary springs and neaps, strong south-west winds, however, have the effect of increasing the depth of water.

side of the harbour is bounded by the north pier, the tongue, and the north quay. The channel of the Ellen at the upper part of the harbour is crossed by a swing bridge with an opening of 46 feet.

The harbour, collectively, is capable of containing 150 sail of coasters, ranging from 50 to 200 tons; the principal portion of which are employed in the coal trade. The dock is calculated to hold 50 sail.

The water ebbs at springs to 130 feet outside the head of the wooden pier; the construction of this work has intercepted a range of sea which formerly troubled the harbour, and the channel runs parallel with, and close along, the north-east face of the pier, till the harbour is entered, which latter is well protected from all winds. The depth of water at the outer pier-end is 22 feet at high-water springs, and 16 feet at neaps; between the north pier-end and the inner tide light on the south pier there is 20 feet at springs and 14 feet at neaps.

**LIGHTS.**—A *fixed white* light is shown all night, for harbour and coasting purposes, from the outer end of the south or wooden pier, it is elevated 30 feet and is visible at the distance of 6 miles. Another light of the same description, is shown from a lighthouse on the stone pier-head farther in, at 55 feet above high-water, while there is a depth of 8 feet into the harbour; it is visible at the distance of 12 miles. A *red* ball is hoisted by day upon a flag-staff just outside the inner lighthouse to indicate the same depth. The passage leading from the outer into the inner harbour is marked by a *red* light on the head of the jetty to the south-westward, and by a *green* light on the head of the tongue to the north-eastward; these coloured lights are shown while there is a depth of 8 feet into the harbour.

**TIDES.**—It is high-water, full and change, at Maryport, at 11h. 26m.; springs rise 25 feet, neaps 19 feet.

**Pilots and Steam-tugs.**—There are pilots for the firth, but no harbour pilots; a harbour-boat is, however, always in readiness to attend warps, &c. Steam-tugs are always in attendance at tide-time; the signal is a union jack at the main by day, and two lights vertically by night.

**Directions.**—Vessels drawing 18 feet, if smooth water, can enter Maryport harbour during springs, and those of 12 feet draught during neaps. No special directions are necessary. In entering, keep the light on the head of the wooden pier on the starboard hand; then pass close along the pier, and afterwards between the *red* and the *green* lights (which are 150 feet apart), into the inner harbour, having previously prepared a warp to hand to the harbour-boat to check the vessel's way, and have both anchors ready.

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shelving fore-shore, generally one-third of a mile wide, consists of sand with patches of rock, afterwards becoming merged in Dubmill scar, described on page 222.

**Anchorage.**—Allonby bay affords good anchorage with off-shore winds in  $2\frac{1}{2}$  to 3 fathoms, but Allonby church should not be brought to the southward of E. by S. on account of the rough and rotten ground (boulders, and aggregations of the sandy tubes of worms), which lies out from and skirts Dubmill scar. There is very little stream of tide in this bay after one-third ebb, owing to the uncovering of the flats from Dubmill point at that period of the tide.

**LEE SCAR.**—From Dubmill point the coast continues as a range of low sand-hills N.E.  $\frac{1}{2}$  N. for  $4\frac{1}{2}$  miles to Silloth; W.S.W. six cables from which is Lee scar, composed of loose stony ground with deep water close outside, and the tide sweeps by it at the rate of four miles an hour.

**LIGHT.**—A pile lighthouse is erected upon Lee scar to mark its position, and to assist in leading up from the bar of the Solway towards Silloth road. The light is *white* and *fixed*, 25 feet above high-water springs, and may be seen 10 miles off in clear weather; being focussed for the bar channel it becomes dim towards Allonby bay.

**Fog Signal.**—A bell is sounded during foggy weather.

That part of the scar on which the lighthouse stands is 10 feet above the level of low-water ordinary springs.

**Anchorage.**—The anchorage off Silloth is described on page 227.

**SILLOTH DOCK.**—Situated about two-thirds of a mile to the eastward of Lee scar lighthouse, is the property of the North British Railway Company.

The harbour accommodation consists of a tidal dock 600 feet long and 300 feet wide, including a space of about 4 acres; the width of the entrance is 100 feet, and the sill is  $4\frac{1}{2}$  feet above the level of low-water ordinary springs. The dock is fitted with hydraulic machinery for loading or discharging cargoes.\*

**Jetty and Light.**—A wooden jetty 1,000 feet long extends from near the entrance of the dock to 300 yards within low-water mark, having at its head a small building and flagstaff, from which is exhibited at night a *yellow* light, until there is 12 feet water on the dock sill, when a *green* light is shown; a *red* ball hoisted on the staff by day indicates the same depth as the green light. Two *red* lights in line lead through the centre of the dock entrance.

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\* A wet dock, to have an area of six acres, is now (1883) in course of construction.



While there is sufficient water, Maryport harbour may be taken in heavy weather ; the entrance to the channel is flat, and it is only necessary to give the jetty-head a good berth.

From the end of the north pier, a large-linked chain extends seaward, parallel to the wooden pier, for the purpose of bringing up vessels obliged to anchor in the channel.

**Life-Boat.**—There is a life-boat at Maryport.

**Supplies.**—Water mains are laid round the quays.

The railway from Furness, which passes through Whitehaven, Harrington, and Workington to Maryport, here leaves the coast and proceeds by Aspatria and Wigton to Carlisle, 28 miles, a branch line striking off beyond Aspatria to the Silloth railway. Railways in connection with the main lines are laid along all the quays of the harbour.

**Trade, &c.**—The chief trade consists in the export of coal and pig iron ; and the import of American timber, iron ore, rock salt, and general produce. The custom-house returns in 1882 were as follows :—Vessels belonging to the port, 86 of 26,523 tons. Coasters, inwards, 1,623=213,091 tons ; outwards, 1,673=220,132 tons. Foreign, inwards, 22=9,808 tons ; outwards, 24=10,940 tons.

**Patent Slip.**—Maryport has a patent slip adapted for vessels of 800 tons,\* there is also a gridiron which is capable of taking vessels 200 feet in length and drawing 11 feet ; and many vessels are built of considerable burden.

The population in 1881 was 8,177.

From abreast Maryport, and even to some distance below it, the whole body of the Solway firth is occupied by dangerous sand-banks, subject to frequent change, and many of which dry at low-water, while the foreshore north-eastward of Maryport gradually gains in breadth until it becomes an extensive outlying flat forming the south-east boundary of the main navigable channel. These various dangers, and the navigation through them, will be found described under the head of Solway sands, page 221.

**ALLONBY BAY.**—The coast from Maryport trends north-east three-quarters of a mile to Bank-end point, the south-western boundary of Allonby bay, the low-water shore of which is composed of loose stones, and the soundings are regular towards it. Dubmill point, the north-eastern horn of the bay, is N.E.  $4\frac{1}{2}$  miles from Bank-end point, and  $1\frac{1}{2}$  mile beyond the village of Allonby, which lies in the bight along the shore. The coast is low, backed by gradually rising ground, and the

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\* The slip can at present only be used by vessels of 500 tons.

shelving fore-shore, generally one-third of a mile wide; consists of sand with patches of rock, afterwards becoming merged in Dubmill scar, described on page 222.

**Anchorage.**—Allonby bay affords good anchorage with off-shore winds in  $2\frac{1}{2}$  to 3 fathoms, but Allonby church should not be brought to the southward of E. by S. on account of the rough and rotten ground (boulders, and aggregations of the sandy tubes of worms), which lies out from and skirts Dubmill scar. There is very little stream of tide in this bay after one-third ebb, owing to the uncovering of the flats from Dubmill point at that period of the tide.

**LEE SCAR.**—From Dubmill point the coast continues as a range of low sand-hills N.E.  $\frac{1}{2}$  N. for  $4\frac{1}{2}$  miles to Silloth; W.S.W. six cables from which is Lee scar, composed of loose stony ground with deep water close outside, and the tide sweeps by it at the rate of four miles an hour.

**LIGHT.**—A pile lighthouse is erected upon Lee scar to mark its position, and to assist in leading up from the bar of the Solway towards Silloth road. The light is *white* and *fixed*, 25 feet above high-water springs, and may be seen 10 miles off in clear weather; being focussed for the bar channel it becomes dim towards Allonby bay.

**Fog Signal.**—A bell is sounded during foggy weather.

That part of the scar on which the lighthouse stands is 10 feet above the level of low-water ordinary springs.

**Anchorage.**—The anchorage off Silloth is described on page 227.

**SILLOTH DOCK.**—Situated about two-thirds of a mile to the eastward of Lee scar lighthouse, is the property of the North British Railway Company.

The harbour accommodation consists of a tidal dock 600 feet long and 300 feet wide, including a space of about 4 acres; the width of the entrance is 100 feet, and the sill is  $4\frac{1}{2}$  feet above the level of low-water ordinary springs. The dock is fitted with hydraulic machinery for loading or discharging cargoes.\*

**Jetty and Light.**—A wooden jetty 1,000 feet long extends from near the entrance of the dock to 300 yards within low-water mark, having at its head a small building and flagstaff, from which is exhibited at night a *yellow* light, until there is 12 feet water on the dock sill, when a *green* light is shown; a *red* ball hoisted on the staff by day indicates the same depth as the green light. Two *red* lights in line lead through the centre of the dock entrance.

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\* A wet dock, to have an area of six acres, is now (1883) in course of construction.

A large-linked chain lies on the north-east side of the entrance, parallel to the wooden jetty, for the purpose of bringing up vessels obliged to anchor in the channel; it is marked at intervals by warping buoys.

**TIDES.**—It is high-water, full and change, at Silloth, at 11h. 40m.; springs rise 26 feet, and neaps 20 feet. At Lee scar is a tide gauge with large figures showing the depth of water in the dock entrance channel.

**Pilots and Steam-tugs.**—Branch pilots can be obtained off Maryport; their boats carry three lug sails, with a number on them, and on the bows, and a steam-tug is kept for towing vessels into and out of the dock; she also takes vessels to and from Annan, and occasionally assists others to Dumfries.

**Life-Boat.**—A life-boat is stationed on the north-east side of the harbour.

The dock is connected by railway with Carlisle direct  $22\frac{1}{2}$  miles, and with the Glasgow and South-western line by a branch across the Solway,  $7\frac{1}{2}$  miles above; rails are also laid down to the dock side and jetty end. There is steam communication with Douglas, Isle of Man, in 6 hours; with Dublin in 14 hours; and with Liverpool in 8 hours; also with Newry once a fortnight.

Water is supplied by hose, and all necessities can be procured here or in a short time from Carlisle.

Silloth is a creek of Carlisle custom-house, the returns from which in 1882 were:—Coasters, inwards, 639=98,607 tons; outwards, 638=98,477 tons; foreign, inwards, 6=2,383 tons; outwards, 5=1,893 tons. Number of vessels belonging to the port, 9=883 tons.

**COTE LIGHT.**—Sand-hills extend for  $1\frac{2}{3}$  mile from Silloth dock to Skinburness, where an hotel stands on a prominent position. Nearly midway, and among the sand-hills, is Cote lighthouse, a wooden framework painted white; the light is *fixed, red*, and 40 feet above high-water; it can be seen 9 miles off, and is used with Lee scar light for leading up from the bar of the Solway; they bear when in line E. by N.  $\frac{1}{8}$  N., and are  $1\frac{1}{2}$  mile apart.

The whole of the foreshore from Silloth to Skinburness is bordered by shingle and sand, and extends nearly 2 cables out.

**Moricambe Bay.**—It is about E.  $\frac{1}{2}$  N., one mile, from Skinburness house to Grune point, on the western side of the entrance to Moricambe or Whampool bay, through which issue the waters of the small rivers Waver and Whampool. Grune point is low, and from it the nearest point of

Cardunock, forming the opposite boundary of the entrance, is E.  $\frac{1}{2}$  N.,  $1\frac{1}{2}$  mile. The bay extends up at its greatest breadth for 2 miles, the Wham-pool entering it from the east under a bridge at the village of Kirkbride; the Waver crossed by a railway and road bridge on the south from near Abbey Holme. At springs the tide reaches far up this inlet, but it is said to be fast filling by the accretion of soil.

**Cardunock Flats.**—Immense tracts of sand occupy the body of the Solway opposite Moricambe bay under the general name of Cardunock flats, their surface being varied by several patches of scar, named the Stennor, Trunk, Sander, Brow, Cardunock, and Porter scars. Cardunock scar is marked by a perch. These banks are again referred to on page 223. A few years since these patches formed the south-eastern boundary of the main navigation of the Solway, but that has since shifted more than 2 miles to the westward. So uncertain are the sands as to position and shape, affected as they are by the freshes from the rivers, which discharge themselves at or near the head of the firth, that it would be useless to attempt any description of the low-water features above Silloth road.

**PORT CARLISLE.**—From Cardunock point a low shore trends easterly for three miles to the village of Bowness on a rising ground, which is also rendered conspicuous by a windmill near the extremity of the point. Half a mile below Bowness the Solway is crossed by the Solway junction railway, upon an iron pile viaduct three-quarters of a mile in length connecting with embankments from the shores, the total length between Bowness and the opposite point of Seafeld being about  $1\frac{1}{2}$  mile; it was opened in September, 1869. The navigation above this is now closed except to vessels with lowered masts. One mile from Bowness is port Carlisle, which is formed by a long wooden pier with a cant partly filled in with rubble to the north-westward, and by a stone covering pier to the south-eastward. A canal 14 miles long was formerly the channel of communication between this place and Carlisle, but it was filled up a few years since, and a railway was laid along it: the basin, which still exists, has its outlet at the heel of the wooden pier.

This port is now abandoned in consequence of the above-mentioned viaduct across the navigation.

**TIDES.**—It is high-water, full and change, at port Carlisle, at 0h. 10m., or 56m. later than at Whitehaven. The flood, which runs for only 3 hours, attains a rate of 5 knots on springs.

At low-water there is a cart-ford to Dornock upon the opposite shore, a distance of  $1\frac{3}{4}$  mile.

**Sandsfield.**—The shore sweeps south-easterly for 2 miles to the village of Drumburgh, where the Silloth railway joins that from port Carlisle, and where the marsh lands commence, which extend about east for

3 miles to Burgh point, between which and Rockcliff marsh the river Eden winds out to its junction with the sea. Sandsfield is above a mile beyond the point; it was the discharging place for small vessels before the canal to port Carlisle was opened and the remains of its storehouses are yet standing. Near Sandsfield, upon the marsh, is a monument erected to the memory of Edward I.

**River Eden**, which enters the Solway at Sandsfield, is one of the largest rivers in the north-west of England; it issues from the side of a hill in the Pennine range near the borders of Westmorland and Yorkshire, and pursues its winding northern course by Kirkby-Stephen and Appleby, and receiving several smaller tributaries, enters Cumberland near its junction with the Eamont. The river is augmented by the Caldew from the south-west, having previously received the Irthing from the eastward; it is crossed by a handsome stone bridge at Carlisle; one mile below by the Caledonian railway, and half a mile below it, by that of the North British railway. It then flows on with a very winding course for 8 miles to its outlet at Burgh point, passing the villages Grimsdale, Beaumont, Rockcliff, and Sandsfield, at which latter place there is a ferry; the whole length of the river being about 65 miles,

The distance from Sandsfield to Carlisle bridge is 8 miles, and this portion of the river is not more than from 200 to 300 feet wide. The highest limit of an ordinary spring tide is about one-third of a mile above the village of Beaumont, or about 3 miles above Sandsfield.

**CARLISLE** is situated on the south bank of the Eden. At the north-west end of the city is its ancient castle restored and occupied by troops; at the opposite end is an extensive and castellated pile of buildings erected for court-houses and gaol, and on an eminence in the centre is the venerable cathedral. Cotton and other manufactures are carried on to a large extent. From the city, branch railways to London, 301 miles; to Edinburgh, 96; to Newcastle 63; and to Maryport, 28 miles. Carlisle is the port of the district; the vessels belonging to it are mentioned with the trade of Silloth, the nearest harbour frequented by shipping,  $22\frac{1}{2}$  miles off. The population in 1881 was 35,866.

**Rockcliff Marsh**.—Abreast Sandsfield, on the opposite side of the Eden, is Rockcliff marsh, a modern formation of soil  $2\frac{3}{4}$  miles long, and generally more than half a mile across, but towards the centre it is contracted to one-third of a mile, the whole of it being partially covered at high-water springs. The western extremity of the marsh, at the time of the Admiralty survey in 1837, touched a line drawn from the western brow of Bonstead hill to Rigg old mill in Dumfries, from whence it extended irregularly E.N.E., and then south-easterly.

**Rivers Esk and Sark.**—The Esk is formed by the union of the White and Black Esks and many other streams, which have their source in the mountainous district of Eskdalemuir, and effect a junction at the King's pool below Bailliehill. From thence the river pursues its course to the town of Langholm 7 miles below; at Liddel Moat near Canonbie, it is joined by Liddel water, which afterwards with the Sark, divides England from Scotland. The Esk enters the Solway from under a road and a railway bridge, 2 miles above Sarkfoot point or the head of the estuary, and 38 miles from its source. The small river Sark enters the firth half a mile north by west from the outlet of the Esk, and both streams flow through shifting channels north of Rockeliff marsh to their junction with the Eden off Tordoff point. The ground between the two streams was formerly called the Debateable land, but it is now attached to England.

**NORTHERN SHORE.**—Abbey Head, one of the outer boundaries of Solway firth, and from which St. Bees lighthouse bears S. by E.  $\frac{1}{2}$  E.,  $19\frac{1}{4}$  miles, is a bold rocky headland, the water being 5 and 6 fathoms deep within one cable of the base of the cliffs. North-east half a mile from the head is Abbey Burnfoot, where is generally an ample stream of water. Small vessels and boats occasionally discharge lime and coal at the mouth of the burn towards high-water, but the operation is always attended by risk.

**TIDES.**—It is high-water, full and change, at Abbey head, at 11h. 10m.; equinoctial springs rise 27 feet, ordinary springs 25 feet, neaps  $18\frac{1}{2}$  feet, and the neap range is 12 feet.

**COAST.**—At  $1\frac{1}{4}$  mile in a N.E. by E.  $\frac{3}{4}$  E. direction from the head, is Port Mary bay, a small bight where strangers must not attempt a landing, as it is full of sunken dangers. At  $1\frac{1}{4}$  mile farther is Barlocco point, where are some extensive caves into which the tide flows. The small bay of the same name on the east side of the point is devoid of shelter, and encumbered by loose stones and shingle.

Castle Moor point has shelving rocks extending from it an eighth of a mile, and Rascarrel bay, of which it is the western boundary, is, like the other small indentures just noticed, unfit for shelter. Afterwards the shore is bolder to Aird and Balcarry points, the former of which is E. by N., 5 miles from Abbey head. See view A. chart No. 1,346.

**BALCARRY BAY**, in which many small vessels may find shelter in westerly and south-westerly winds, is immediately within Balcarry point, at the south-west part of Auchencairn bay; Balcarry house is at the head of it. The whole of the bay is dry at low-water, but the bottom is a mixture of mud and sand, on which vessels lie securely.

In entering, round the point closely, leave the perches on the port hand, and luff into the bay towards Balcarry house as near as the draught of the vessel and the direction of the wind will permit. With the wind between west and north-east, a small vessel may find snug anchorage between Balcarry point and Hestan island in  $1\frac{1}{2}$  to 2 fathoms at low-water springs. The tide streams set strongly past all the points, but are slack immediately within the line joining them. There is an oyster bed at Balcarry point, but it can only be reached at low-water springs.

**TIDES.**—It is high-water, full and change, at Balcarry, at 11h. 15m.

**AUCHENCAIRN and HESTAN BAYS** are the two heads of one inlet within Balcarry point, and Almorness, the western point of Urr water; Torr point being the central division. The whole inlet has a bottom of fine sand, which is left bare at low-water. The village of Auchencairn is at the north-west part of Auchencairn bay, and 2 miles N. by W. from it is Bengairn mountain, elevated 1,267 feet above high-water, and a conspicuous object from every part of Solway firth.

**HESTAN ISLAND**, the eastern boundary of the entrance to Auchencairn bay, is E.N.E. two-thirds of a mile from the extremity of Balcarry point; it is about one-third of a mile long N.N.E. and S.S.W., the highest part being towards the north end. A natural causeway of shingle connects the islet with Almorness, and until the water leaves this, which it does at about two-thirds ebb, the ebb stream sets over it directly for Balcarry point, and, again, when it is covered the flood stream sets across it into the Urr. Hestan islet is steep-to on the outside, and there is an oyster bed on its west side.

**URR WATER** issues from loch Urr, a small lake in the boundary between Dumfriesshire and Kirkeudbrightshire, and, augmented by several streams from similar lakes, runs 26 miles to its outlet at Solway firth, its prevailing direction being south.

Urr water issues one mile to the north-eastward of Hestan island from between the Moyl of Almorness and Castle head. About N.N.W. half a mile from Castle head is Rough island, one-quarter of a mile in length north and south, and about one cable across. Some rocks, named the Spring stones, at the south extremity of the island are marked by a perch, which is to be left on the starboard hand in entering.

The mouth of the Urr has a width of three-quarters of a mile within Castle head, but it becomes contracted to less than one-quarter of a mile abreast the village of Scar or Kippford 2 miles up on the left bank, and Glen isle a projection from the opposite side. The channel leads from close under Castle head over to the western shore, and here, in a pool named Gibbs hole, which may be entered after half-flood, is anchorage in

10 to 12 feet at low-water, with good holding-ground. This position is secure except in gales from the south-eastward, when a heavy sea sets in after half-flood, the banks being then well covered. The leading mark in from sea to nearly as far as Rough island is, South Glen hill, in line with the east side of Rough island, bearing N.N.W.; having neared the island to 2 cables, proceed to the westward of it, and haul over to the western shore to Gibbs hole, which is in the bight just below Heugham cot, the only building visible near the shore.

From Glen isle, the river winds for 2 miles to the small shipping-place of Palnackie, or Barlochan, where the stream is only 250 feet wide. A small dock here admits alongside its quay vessels of 14 feet draught on springs, and the flood stream runs up at the rate of  $3\frac{1}{4}$  knots. From this point the Urr continues with an average width of 100 feet for  $2\frac{1}{4}$  miles to the port or Dub of Hass. Some large patches of rock between the mansion of Munches and the port greatly obstruct the navigation, and should be removed. The river in their vicinity is only 50 feet wide. Vessels of 9 feet draught can reach the place at high-water springs.

**TIDES.**—At the port of Hass, it is high-water, full and change, at 12h. Om.; springs rise 9 feet. The flood stream runs only for 2 hours.

**Dalbeaty.**—Two streams here effect a junction, the western being the river Urr and the eastern Dalbeaty burn. The village of Dalbeaty, with a population in 1871 of 2,937, is about half a mile above the shipping-place; small vessels can at times reach it. There is a considerable traffic up Urr water; Palnackie or Barlochan is a creek of Dumfries.

**Craig Roan.**—From Castle head the coast trends E.  $\frac{3}{4}$  S., for one mile, and afterwards E. by N.  $\frac{1}{2}$  N.,  $2\frac{3}{4}$  miles for the mouth of Southwick water and the marsh land eastward of it. The low-water shore for the first mile is rocky, and a ledge named Craig Roan lies out one-third of a mile S.S.W. to the eastward of the head; its highest part dries 19 feet, and it appears at two-thirds ebb as three distinct lumps. In standing into Urr water, any part of Rough island seen open of Castle head will lead clear of the ledge.

**BARNHOURIE SAND.**—From the mouth of Southwick water the coast holds about S.E. by E.  $3\frac{1}{2}$  miles for Southernness, from off which point Barnhourie sand extends in a west-south-westerly direction for  $5\frac{1}{2}$  miles, its western margin, with a deep bight, reaching to within one mile of Castle head. Near this junction is Porthing bay, over which is Whitehill, a prominent object 456 feet above high-water.

**Douglas Bay,** more than one mile north-easterly from Porthing bay, is of little importance, affording depth at high-water for only very small vessels, and that in fine weather. Southwick water, and the higher range of hills continue in an easterly direction, the latter uniting with Criffell



over the west shore of the firth, which hill is elevated 1,852 feet; its summit bears N.  $\frac{1}{2}$  E.  $4\frac{1}{2}$  miles from Southernness tower, and is a prominent feature in every direction.

**SOUTHERNESS** is the south-eastern projection of the tract of low land named the Merse, having the village of Southernness, consisting of a few cottages, near its extremity. Ledges of rock extend from the low point one-sixth of a mile in a southerly direction, and there is much rocky ground to the eastward and westward. Two small patches, which dry  $8\frac{1}{2}$  feet at low-water springs, and are detached from the low-water margin, are named the Spring stones, and Black rocks; they bear, respectively, E.  $\frac{3}{4}$  N., half a mile, and E. by N.  $\frac{3}{4}$  N., three-quarters of a mile, from the tower. A square white tower stands at the high-water extremity of Southernness; it was formerly a lighthouse, but the light was discontinued in 1867.

**RIVER NITH** is the largest river of Dumfriesshire. Its principal head streams rise on the north sides of Knife hill, elevated 1,260 feet, and Benhain hills on the border of Ayrshire. After passing the village of New Cumnock and receiving Connal burn and Afton water, it enters Dumfriesshire, and from the boundary flows east and south-east for 20 miles till it is joined by the Skaar, having passed westward of the towns of Sanquhar and Thornhill. It then continues  $11\frac{1}{2}$  miles S.E. by S. to a point near the confluence with it of the Carin from the westward, and making a bold sweep westward round the town of Dumfries, runs nearly due south  $6\frac{1}{2}$  miles to the narrows at Aird point, or 11 miles to Burron point, where at about low-water it unites with Solway firth. About  $2\frac{1}{2}$  miles below Dumfries it begins to expand, but does not exceed half a mile in width at Aird point. The Nith, exclusive of all minor bends and windings, has altogether a course of 49 miles.

The river Nith issues from the sandy flats through which it runs,  $2\frac{1}{2}$  miles to the eastward of Southernness, and three-quarters of a mile off Burron point; the first contraction of the high-water bounding shores is  $4\frac{1}{2}$  miles above.

From Southernness the shore trends N.E.  $\frac{1}{4}$  E. for  $2\frac{1}{4}$  miles to Burron point, and is low, with high trees to the northward of the mansion of Arbigland half a mile to the westward of Burron point. From Burron point it is N.  $\frac{1}{4}$  E., one mile to Carsethorn village, abreast which is a jetty for the use of steamers during neaps, when they cannot ascend higher up the Nith. From hence, the shore continues irregularly N. by E.  $\frac{3}{4}$  E., for  $3\frac{1}{2}$  miles to Kirkconnel or Aird point, where the shores approach each other to the distance of half a mile.

From this position, the general direction of the Nith is northerly. At  $1\frac{1}{2}$  mile on the left or eastern bank is Glencaple quay, 5 miles below

Dumfries ; it is the principal shipping-place on the Nith, admitting vessels of 15 feet draught alongside it at high-water springs, and though a rude structure, it is adequate to the requirements of the few vessels that frequent it. The steamboat trading to the Nith reaches the quay at high-water springs, but during neaps she calls at Carsethorn, as before mentioned. From Aird point, the river is bounded on the west side by an embankment, which is continued to abreast Conheath, half a mile above the quay, and which is covered when there is 9 feet of water in the channel ; upon the embankment are perches with cross tops, and on the eastern side of the channel are perches with brooms. At 2 miles above Glencaple is Netherwood, where the high-water embankments have not unfrequently been submerged on high springs ; the shores here approach to one-fifth of a mile, and the channel, hitherto sand, is encumbered by several patches of gravel. After Netherwood merse, the river is 100 yards wide, and runs N. by E. one mile to New quay, which is on the eastern bank about  $1\frac{1}{2}$  mile below Dumfries ; here is a small dock admitting vessels drawing 10 feet at high-water springs. The river from hence upwards has been improved by confining and straightening its course. One mile above New quay is Castle Dikes, usually the limit of ascent to small coasters during springs, though they do occasionally reach the Dock head abreast the town. The bed of the river below Castle Dikes is composed of rock, partly bare at low-water. From Castle Dikes it is three-quarters of a mile to the caul or dam, just below the old bridge of Dumfries, above which the tide does not flow ; the bed of the river is here composed of gravel.

**TIDES.**—It is high-water, full and change, at Southerness, at 11h. 50m. ; and at Dumfries at 12h. At Southerness, the rise at springs is  $27\frac{1}{4}$  feet, and of neaps  $19\frac{1}{2}$  feet ; springs rise 6 feet at Dumfries. By subtracting 3 feet from any tide in the Liverpool or Isle of Man tables, the rise of tide for Glencaple will be found.

**Pilots.**—Nith pilots can be procured at Carsethorn and Glencaple.

**Directions.**—No directions for the Nith would be of any avail, for the channel across the flats from Southerness to Glencaple quay is shallow, winding, and changeable. If a vessel of heavy draught is bound up the river, it is usual to go to Kirkcudbright and send for a pilot ; a stranger should not attempt the Nith without such assistance.

**DUMFRIES**, a royal burgh and county town, though a place having comparatively little trade, is of considerable magnitude, and one of the most important in the south of Scotland. The scenery surrounding it is noted for its great beauty, and includes several extensive ruins, Lincluden abbey, New abbey, and Caerlaverock castle. The river is crossed by three bridges, a railway, a road, and a footbridge, the latter a very ancient structure, having originally 13 arches and at the time considered second

only to old London bridge; it has now but 6 arches and is used for foot passengers only. From Dundee there is direct communication by railway with Glasgow, 92 miles; to Lockerbie, by the Caledonian line to Edinburgh, 90 miles; to Carlisle, 33 miles; Kirkcaldy, 30 miles; Stranraer, and Portpatrick, 73 and 80 miles; a trading steamer also runs to Liverpool. There are but few manufactures, the chief being cotton goods and shoes; the exports, agricultural produce, and the imports, timber, iron, and coal.

The *custom-house* returns in 1862 were:—Coasters, inwards, 548=26,794 tons; outwards, 550=26,468 tons. Foreign, outwards, 1=332 tons. Number of vessels belonging to the port, 40=3,692 tons.

The population in 1881 was 17,090.

From fear point, at the eastern side of the entrance of the Nith, opposite Aird point, the low shore rounds to the eastward for  $3\frac{1}{2}$  miles to the outlet of the Locher, a small stream running parallel with the Nith. A little back from the shore are the ruins of Caerlaverock castle, surrounded and nearly covered in by wood. At the mouth of the Locher the shore is very flat, and from the rivulet being subject to freshes, the flats and sand are often liable to change; the fall also for several miles inland is so gentle as to render it a difficult matter to establish any efficient drainage for the bordering mosses. From the Locher to Barnkirk point, or Annan-foot, at the outlet of the Annan, the general direction is S.E. by E. and the distance  $6\frac{1}{2}$  miles, Priestwoodside moss occupying a large portion of the land within the shore, which latter is bounded by a beach of shingle; while about midway is the village of Cummertrees, on a rise a little within the high-water margin.

**RIVER ANNAN** rises on the south side of Hart fell, elevated 2,635 feet, near the junction of the three counties of Lanark, Peebles, and Dumfries, and flows in a southerly direction past Moffat and Lochmaben; then south-east and south, under Annan road and railway bridges, and from thence  $1\frac{1}{2}$  mile to its junction with the Solway at Barnkirk point. The total length of the river is 30 miles, and it is swelled by several tributaries, two of which, the Ae from the north-west, and the Moffat from the north-east, are famed for their falls, called "Greymares tails," one of 90 and the other of 300 feet.

**LIGHT**.—Barnkirk point, or Annan-foot, the south-west point of the outlet of the Annan, is one of the most prominent objects in the upper part of the Solway; it is about 50 feet above high-water. On this stands the lighthouse which exhibits a *fixed white* light from half-flood to half-ebb. A flag is hoisted during the same period of tide by day.

**Fog Signal**.—A bell is sounded during fog.

The channel of the Annan runs close by the point. Immediately outside Annan-foot is a scar, to avoid which care must be observed if entering the river at early tide.

Vessels of 9 or 10 feet can ascend to the town quay. The Annan is crossed by a fixed bridge of three arches  $1\frac{3}{4}$  mile above Annan-foot, and there is a dam and a railway bridge a little below it. The general width of the river up to the bridge is about 100 yards.

**TIDES.**—At the mouth of the Annan, it is high-water, full and change, at Oh. 5m.; springs rise  $28\frac{1}{2}$  feet, and neaps 20 feet.

Annan is a royal burgh of very ancient date; it is connected with the main lines of railway by Gretna, distant 8 miles; the Solway junction to Maryport and Sillioth; northward to the Caledonian line by Kirtlebridge; and to Dumfries, 15 miles.

The manufacture of cottons is carried on; shipbuilding to some extent, with rope works and salmon fishing, form the chief trade of the town; it imports timber and slates, and exports agricultural produce. The custom-house returns of Annan are included in those from Dumfries, there being no officer stationed at it.

The population in 1881 was 3,366.

From Annan-foot to Dornock burn the distance is 2 miles E.  $\frac{1}{4}$  S., when the coast trends out for the same distance south-east to Tordoff point. From Seafield point, three-quarters of a mile from Annan-foot, the Solway junction railway, already mentioned, crosses the estuary in nearly a south direction for Bowness; and from near Dornock there is a cart-ford to port Carlisle,  $1\frac{1}{2}$  mile across.

From Tordoff point to Redkirk point is E.  $\frac{1}{4}$  S., 2 miles, and from thence to Sarkfoot, E. by N.  $\frac{1}{4}$  N.,  $1\frac{1}{4}$  mile; the shore is low with a rising background, and fronted by some shingle and sand. The Sark, as has been already noticed, here divides England from Scotland, and one mile above the small bridge which crosses it at one-third that distance from its marshy outlet, is the well-known Gretna Green. The streams of the Sark, Esk, and Eden, unite off Tordoff point, and run in a shallow channel past Bowness and Annan-foot, at about two cables off the shore.

**SOLWAY SANDS.**—The whole body of Solway firth is more or less occupied by outlying banks and extensive flats projecting out from the mainland, leaving between them channels which are subject to frequent change. English channel, and its continuation upwards under various names, is now (1883) the only passage which is lighted and buoyed. The sands, as they occur, proceeding in from seaward, are as follows:—

**WORKINGTON BANK**, the outermost shoal, and on the north-west side of English channel, is composed of fine sand; it is  $2\frac{3}{4}$  miles

long in a N.N.E. and S.S.W. direction, between the 1 fathoms line, and the lower N. by E.  $\frac{1}{2}$  E.  $2\frac{1}{2}$  miles from Worthington Lightship. The shallowest water, 18 feet, prevails for a distance of about three-quarters of a mile at the northern portion of the bank. There is a heavy sea on the bank in bad weather.

**THREE-FATHOMS BANK.**—The south-west extremity of this bank, including a depth of 3 fathoms, is N.W.  $\frac{1}{2}$  W., one mile from 1 fathoms on the northern end of Worthington bank; and, with the latter shoal, forms the south-west boundary of English channel; from the above point it extends as a narrow bank N.E.  $\frac{1}{2}$  E.  $2\frac{1}{2}$  miles, with from 10 to 18 feet upon it, the 10-foot ridge bearing from Worthington Lightship between N.N.W. and N.N.W.  $\frac{1}{2}$  W., distant  $2\frac{1}{2}$  miles. There is from 6 to 9 fathoms in that part of English channel within it. During the whole of westerly winds, there is a great swell on this bank, from the stream setting obliquely over it.

**ROBIN RIGG and NORTH BANKS.**—Robin Rigg, which dries  $6\frac{1}{2}$  feet, lies abreast Allonby, and with its outlying shoals forms the north-western boundary of Silloth channel. The south-west extremity of the dry portion of Robin Rigg bears N.W. by W., 5 miles from Allonby church and from thence extends for upwards of one mile in a north-easterly direction. From the above mentioned extremity, a spit projects nearly 8 miles to the south-westward, in a curve, water towards the south-east, with from 4 to 9 feet over the whole distance, and terminating in Two-foot bank.\*

North bank is separated from Robin Rigg by a channel one-third of a mile wide, with 30 feet water in it; the bank extends to the south-west 9 miles; it is nearly parallel with the spit from Robin Rigg, and forms with the latter a danger 2 miles broad, having many dry places on it, with deep water amongst them; it also extends from abreast of Robin Rigg to the north-east, and varies from awash to 8 feet dry at low-water. In this direction it is separated from Silloth bank by a deep channel ending in a swash through the bank 2 cables wide with a depth of 2 feet, leading into Barbara channel 4 miles above Southerness point.

**SILLOTH BANK.**—The upper portion of North bank joins the north-east end of Silloth bank, which from thence extends in a south-westerly direction for about 5 miles, and dries at its highest part 18 feet.

**DUBMILL SCAR, Beckfoot Flats, and Far Sand,** are portions of one extensive flat which projects from off the shore between Allonby and Silloth. The whole of this flat is dry at low-water springs.

\* The name Two-foot bank is still retained, but when the last Admiralty survey was made in 1875-6 the least depth over that portion of the spit was  $1\frac{1}{2}$  fathoms.

Ellison scar, the outermost part of the projection, consists of worm-sand and large stones; the highest part at the north-east corner dries  $4\frac{1}{2}$  feet, and is N. by W.  $\frac{1}{2}$  W.  $3\frac{1}{2}$  miles from Allonby church; from this spot the scar extends S.W.  $\frac{1}{2}$  W. one mile, and its south-west point is  $1\frac{1}{2}$  mile from the nearest part of Robin Rigg. Shoal water continues thence S.W.  $\frac{1}{2}$  W. for  $1\frac{1}{2}$  mile, forming the south-eastern boundary of the channel; between this spit and the Allonby shore is shallow and foul ground, and the bight which is formed below should be carefully avoided. From Ellison scar, the flat holds N.E. by E.  $\frac{1}{2}$  E., and continues nearly straight in that direction for 4 miles to Lee scar lighthouse. The inner part of it, consisting chiefly of sand, is named Beckfoot flats, between which and the outer, or Far sand, are large patches of rock. Catherine scar, upwards of three-quarters of a mile in length, is near the outer margin of the flats,  $1\frac{1}{2}$  mile south-west of Lee scar lighthouse. Lying out half a mile from these dangers, and parallel to them, is a ridge  $1\frac{1}{2}$  mile in length; it has from 4 to 8 feet water over it, and its south-eastern side is marked by D. 1 *black* nun buoy.

**MIDDLE BANK, &c.**—Off Skinburness shore there is a blind channel formed by the outlet of the streams from Moricambe bay, and beyond it, extensive sands, called Middle bank, Powfoot bank, and Cardunock flats, stretch across towards the Scotch shore, leaving but a narrow channel between.

**SOLWAY LIGHT-VESSEL**, for marking the fairway channel over the bar, is moored in 5 fathoms, 2 cables distant from a depth of 11 feet on the south-east side of the channel, between Robin Rigg bank and Far sand spit projecting from Ellison scar; she shows a *fixed red* light, 25 feet above the water, which is visible at the distance of 6 miles in clear weather. The vessel is painted black, with "Solway" in white letters on her sides, and by day a black ball is hoisted at the foremast.\*

**Fog Signal.**—A bell is sounded during fog.

The present position of the vessel is N. by E. distant  $4\frac{3}{10}$  miles from Maryport outer lighthouse; N.W.,  $3\frac{8}{10}$  miles from Allonby church; S.W. by W.  $\frac{3}{4}$  W.,  $5\frac{8}{10}$  miles from Lee scar lighthouse, (all over sands); and N.E.  $\frac{1}{4}$  E.,  $2\frac{4}{10}$  miles from the Fairway buoy. Lee scar light and Cote light have been described on pages 211 and 212.

**BUOYS.**—Solway firth was first buoyed in 1837, and, with the exception of the outer buoy, placed in 1867 by the Trinity Board, the buoys marking the channel leading to Silloth are maintained by the North British Railway Company; of these latter buoys the *red* cans are to be left on the starboard side entering, the *black* nuns upon the port hand, and the *striped* buoys are mid-channel.

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\* A view of Solway light-vessel is given on chart No. 1346.



**Two-foot Bank**, the outer buoy, is a conical buoy, *striped red and white horizontally*, with staff and diamond, and lies in 4 fathoms, 6 cables west of a depth of 12 feet on the tail of Robin Rigg; From it, St. Bees lighthouse bears S.  $\frac{1}{4}$  W., distant  $12\frac{1}{10}$  miles; Maryport outer lighthouse, E. by S.  $\frac{1}{2}$  S., 8 miles; Workington pier lighthouse, S.E.  $\frac{3}{4}$  S.,  $6\frac{8}{10}$  miles; and Harrington pier lighthouse, S.S.E.  $\frac{1}{4}$  E.,  $8\frac{1}{10}$  miles, (over sand).

**Fairway**, the next buoy upwards is a nun, *striped horizontally black and red*; it lies in  $6\frac{1}{2}$  fathoms, S.W.  $\frac{1}{4}$  W.,  $2\frac{4}{10}$  miles from Solway light-vessel, and may be passed on either hand; from it, Maryport lighthouse bears S. by E.  $\frac{1}{4}$  E., distant  $2\frac{2}{10}$  miles; the buoy B. 1, *black*, bears N.N.E.  $\frac{3}{4}$  E.,  $1\frac{1}{2}$  mile; and B. 1, *red* buoy, N.E.  $\frac{3}{4}$  E.  $1\frac{1}{4}$  mile.

B. 1, *black* buoy, lies in 20 feet off the south-east part of Robin Rigg; N.N.E.  $\frac{3}{4}$  E.,  $1\frac{1}{2}$  mile from the fairway buoy; and S.W.  $\frac{7}{8}$  W.,  $1\frac{1}{10}$  mile from Solway light-vessel. B. 1, *red* can, is E. by S., three-quarters of a mile from B. 1 *black* buoy; N.E.  $\frac{7}{8}$  E.,  $1\frac{1}{4}$  mile from the fairway buoy; and S. by W.  $\frac{1}{4}$  W.,  $\frac{9}{10}$  of a mile from the light-vessel; it lies a short distance north-west of the tail of Far sand spit. B. 2, *black* nun, and B. 2, *red* can, which are 2 cables apart, mark the channel  $1\frac{1}{4}$  mile above the light-vessel. D. 1, *black* nun, with perch, is off the south-east side of a four-foot bank already described, and is N.E. by E.  $\frac{1}{8}$  E.,  $1\frac{2}{10}$  mile from B. 2, *red* can. Above this, E. by N.  $\frac{1}{2}$  N.,  $1\frac{1}{2}$  mile, is a *black and white vertically striped* buoy in the fairway; six cables north-east from which, and placed close to the steep south-east side of Silloth bank, is a *black* can buoy marked S.B.; then N.E. by E.  $\frac{1}{2}$  E.,  $2\frac{2}{10}$  miles, from the black and white vertically striped buoy, and abreast Silloth, is N. 1, *black* can, at the commencement of the North channel to Annan. N. 2, *black* can buoy, lies N.E.  $\frac{1}{8}$  N.,  $1\frac{1}{4}$  mile from N. 1.

**DUMROOF BANK**, forming the north-western boundary of Middle channel, is an extensive danger, portions of which dry 2 feet; its south-west extreme, in a depth of 6 feet, is 5 miles south of Hestan island and three-quarters of a mile north of the south-west extreme of North bank; it extends from thence, with a very irregular breadth,  $5\frac{1}{2}$  miles to the east-north-east, and is connected to Barnhourie sand by a shallow neck having 3 to 4 feet over it.

**BARNHOURIE SAND** dries out from the main between Whitehill and Southerness for 4 miles in the form of an irregular triangle, and bounds Scotch deep, and Dumfries channel, to the north-westward.

**BLACKSHAW FLATS and BANK.**—The whole of the space embraced by the converging shores and a line drawn from Southerness to Powfoot, is, with the exception of the channels of the Nith and Lochar, occupied by Blackshaw flats and bank, which are uncovered at

low-water, and form the northern boundary of Barbara and Powfoot channels.

**SCOTCH DEEP**, between Barnhourie sand and Dumroo bank, is now closed by a bar of 4 feet water. The buoyage of this channel is no longer maintained. The outer buoy, however, still remained in 1876; it is a *black* nun buoy, marked "S. G. 1," and lies in 22 feet, one mile north of Dumroo bank, with Abbey head bearing W. by N.  $\frac{3}{4}$  N., distant  $6\frac{9}{10}$  miles; Hestan island, N.  $\frac{1}{2}$  W.,  $3\frac{1}{2}$  miles; and Two-feet bank buoy, S. by W.,  $4\frac{1}{4}$  miles.

**MIDDLE and DUMFRIES CHANNELS.**—Middle channel is formed between Dumroo bank and North bank; it has 21 feet over the bar at its entrance, and 5 to 6 fathoms within, with a breadth of three-quarters of a mile, which breadth and depth are maintained to its junction with Scotch deep; it is then called Dumfries channel, and continues in the same direction past Southerness, where a bar of 7 feet water separates it from the deep water off that point.

**BARBARA and POWFOOT CHANNELS**, in continuation of Dumfries channel south and east of the river Nith, are between Blackshaw bank and Powfoot flat on the north; and North, Silloth, Middle, and Powfoot banks on the south; these channels are much encumbered by sandbanks, which dry.

Powfoot channel is buoyed in continuation of English channel past Silloth: the buoys are all *black* and placed in the deepest water. Three buoys mark the narrow swash between Silloth and Middle banks, in which the depth is 15 feet at high-water spring tides, and 9 feet at neap tides; two more buoys mark the continuation of the channel to Annan.

**TIDAL STREAMS.**—The flood and ebb streams set in and out along the Cumberland coast, between Whitehaven and Workington, when it is low and high water by the shore. The rate of each stream averages  $2\frac{1}{2}$  to 3 knots on springs, and  $1\frac{1}{2}$  knot on neaps.

At an offing of 5 miles north of St. Bees, the flood and ebb set E.N.E. and W.S.W., respectively, to abreast Workington, with a rate of 3 knots at springs, and  $1\frac{1}{2}$  knot on neaps. In English channel, between Workington and Silloth the flood runs 5 hours, and the ebb 7 hours; their average rate being 4 knots during springs, and 2 knots during neaps; turning at about high and low-water at Silloth.

Off Lee scar and Silloth there is but little stream of tide, except during the last-quarter flood and first-quarter ebb, when the banks between Silloth and Powfoot channel are covered.

The flood sets in an easterly direction along the Scotch shore, and through all the channels towards the Nith: both flood and ebb run princi-



pally through Middle channel and its continuation to Annan. Over the outer part the average rate is  $3\frac{1}{2}$  knots at springs, and 2 knots at neaps, but as the channel narrows towards Southernness point, its rate increases to 4 or 5 knots at springs, and 3 knots at neaps, these rates continuing as far eastward as Annan, off which place it occasionally runs at the rate of 6 knots.

Off Southernness the flood runs 5 hours, and off Annan about 4 hours.\*

**GENERAL REMARKS.**—So long as St. Bees head or light is not brought to the southward of S.  $\frac{1}{2}$  E., a vessel will be in a fair berth outside all the dangers in Solway firth, and with that bearing, or anywhere between Abbey head and Balcarry point, the Scotch shore may be safely approached to the distance of half a mile.

The wrecks which have taken place in the Solway have generally been owing to errors in reckoning, due to vessels passing the Isle of Man without sighting it, and then mistaking the Solway for the Mersey, and in some instances for the Clyde.

In hazy weather no coaster should enter the firth on the Scotch side, for the banks are there farther off shore, and there are no leading marks or objects to guide the seaman. In westerly gales, excellent shelter will be found either in Kirkcudbright, or Balcarry, bay.

South-westerly gales generally cause the highest sea in the firth; with the wind from west and north-west a heavy sea is found off Workington, but it falls as the vessel proceeds farther up. A stranger having arrived at the entrance of the firth in a south-westerly gale, and being upon the English shore, had better hang off St. Bees (if that be practicable) in preference to running up; or he may lie to off Maryport, where the sea is reduced by half; if, however, the latter place has been clearly recognised, he may proceed on to Silloth road. In misty weather, no vessel should attempt to proceed to the inner part of the firth until Maryport has been sighted.

While working in, or crossing the outer part of the firth, Screel, the eastern peak of Bengairn mountain, open to the westward of Great Aird hill, near Balcarry point, bearing North, will clear the spits of Dumroo and Robin Rigg (*see* view A., chart No. 1346†). If at night, it will be well to bear in mind that Lee scar light becomes dim towards Allonby bay.

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\* Barnhourie and Dumroo sands have been gradually extending towards the south-west, and the strength of the ebb stream decreases in Scotch deep, as it increases through the more direct Middle channel, which is becoming deeper, and in time the bar may probably be forced away.

† In this view the peak bears N.  $\frac{1}{2}$  W.

**Directions for English Channel.**—Bound up the Solway, and having rounded St. Bees head, which, from its well-marked character, is an excellent beacon for leading towards the firth (see view on chart No. 1,346), keep one mile or  $1\frac{1}{2}$  mile off the shore, according to the wind, to abreast Workington, from which an offing of  $1\frac{1}{4}$  mile, and a depth of not less than 5 fathoms, will clear the dangers to Maryport. If working, the dome of the upper church in Workington, in line with the lighthouse, bearing S.E., will lead half a mile to the south-westward of Three-fathoms bank; and will clear by one mile the shoalest part of it (10 feet), which is N.N.W.  $\frac{1}{4}$  W.  $3\frac{6}{10}$  miles from Workington lighthouse.

Having arrived abreast Workington, and being one mile off shore, with the dome of the upper church at that place in line with the lighthouse, the Solway light-vessel will bear N.E.  $\frac{5}{8}$  N.,  $8\frac{1}{2}$  miles distant; and the fairway buoy N.E.  $\frac{1}{4}$  N. northerly,  $6\frac{1}{4}$  miles.

Proceeding up, the fairway buoy may be passed on either hand, then steer from it N.E., which will lead between the first two buoys marking the entrance to the channel over the bar to Silloth, leave the light-vessel two cables on the starboard hand, and, having passed her, bring Cote lighthouse in line with Lee scar lighthouse, bearing E. by N.  $\frac{3}{4}$  N. northerly, which leads over the bar in  $7\frac{3}{4}$  feet at low-water springs. When within about half a mile of Lee scar, open Cote lighthouse to the left of Lee scar lighthouse, and, when the latter bears S.S.E., anchor in Silloth road in about 4 fathoms. The channel here is less than half a mile wide.

**Anchorage.**—Besides Silloth road, Catherine Hole affords very good shelter; it lies between the *striped* buoy and Lee scar, and the anchor may be let go anywhere above the buoy in from 3 to 5 fathoms at low-water, over sand and clay.

In moderate weather, vessels may wait the tide near the fairway buoy two miles below the light-vessel, anchoring in 5 or 6 fathoms.

Being bound up the Solway to Annan, it is necessary to obtain the assistance of a pilot or steam-tug, for the navigation should not be attempted by a stranger, on account of the rapidity of the tides, as well as the changes to which the channels are subject. It may be, however, of service to know that the course for North channel should be altered at the *striped* buoy, hauling up N.E. by E.  $\frac{1}{2}$  E. for N. 1 *black* buoy, and afterwards following the buoys, as they are placed in mid-channel.

From the absence of buoys and available land-marks for guides, no directions can be given for navigating the channels on the north or Scotch side of the Solway. They should be entirely avoided by keeping Screeel, the east peak of Bengairn, open west of Great Aird hill, near Balcarry

point, bearing North,\* which mark will lead westward of Two-feet, and Dumroo, banks, in not less than 4 fathoms at low-water.

**ABBEY HEAD to the Westward.**—From Abbey head † a bold rocky coast extends W.N.W. for  $2\frac{1}{2}$  miles to Balmae head, the eastern boundary of the entrance to Kirkcudbright bay; this portion of the coast is free of danger at 2 cables off.

**KIRKCUDBRIGHT BAY†** has its entrance between Balmae head and Little Ross island, which bears from the former W. by N., distant  $1\frac{1}{2}$  mile. The bay is  $2\frac{3}{4}$  miles deep to St. Mary isle in a N.N.E. direction, and one mile wide; but about half its extent is occupied by the Manxman and Millton sands, which, drying at low-water, leave only a passage for the waters of the Dee, that has its outlet on the eastern part of the bay.

**River Dee**, traversing the length of the Stewartry of Kirkcudbrightshire, which it divides into two nearly equal parts, has as sources about a dozen rills, rising in the broad mountain range which separates the county from that of Ayr. The highest and parent stream rises about one mile from the boundary, and before receiving the surplus waters of loch Dee flows circuitously about 6 miles under the names of Sauch burn and Cooran lane. It then flows 17 miles north-east, receiving numerous rills in its course, and falls into loch Ken; thence, over a distance of 9 miles, it winds round from S.E. to S.W., and maintains the latter direction for 13 miles, till it arrives opposite the church of Tongueland. The river falls over a series of rocky precipices, and a little below is spanned by a fine bridge of one arch of 110 feet. Half a mile farther it is joined by the Tarf from the north-west, and  $1\frac{1}{2}$  mile from the bridge sweeps past the burgh of Kirkcudbright, and gradually widening out, at a distance of  $3\frac{1}{4}$  miles unites with the waters of the bay; the total length being about 46 miles. The Dee has always been noted for its salmon fishery.

On the eastern side of the bay the shore, consisting of rocky ledges, extends N.N.W. one mile from Balmae head to Torr point, when it trends N.E. by N. three-quarters of a mile to the outlet of the Dee; then with an easterly bend for two miles to Sandside, where the coast rounds out south-west about one mile along the eastern shore of the peninsula named St. Mary isle. The whole of the indenture thus formed, and called the Lake, is, up to the limit of the river channel, occupied by Manxman sands. Three-quarters of a mile above Torr point, near Cutler's pool, the low-water

\* See view A., chart No. 1,346, in which, however, the peak bears N.  $\frac{1}{2}$  W.

† See Admiralty chart, Scotland, west coast, sheet 1, firth of Solway to loch Ryan, No. 1,971; scale,  $m = 0.5$  inch.

‡ See Admiralty chart, Kirkcudbright bay, No. 1,979; scale,  $m = 3.0$  inches.

margin is marked by a perch ; another perch is placed on the stony point within the sand half a mile above ; and two others at the edge of the rock off the south-west end of St. Mary isle.

**LIGHTS.—Little Ross.**—Off the point of Great Ross, which is elevated 272 feet, at the western part of the bay, is Little Ross island, a narrow passage 2 cables across and encumbered by Richardson rock, separating it from the main. The island, which is nearly an oval in form, is one-quarter of a mile in length north-east and south-west. A white lighthouse, 65 feet high, stands on the summit of the island ; its *white light flashes every five seconds* at a height of 175 feet above high-water, and may be seen at the distance of 18 miles in clear weather. It is not visible between the bearings S. by W. and S.E. by E. A white needle beacon stands just below, and to the north-eastward of the lighthouse, for leading into the entrance of the Dee.

From Little Ross lighthouse,—

Point of Ayre lighthouse, Isle of Man, bears	S.W. $\frac{1}{8}$ W.,	23 $\frac{1}{2}$ miles.
Burrow head - - -	W. $\frac{1}{2}$ S.	12 "
Abbey head - - -	E. by S. $\frac{1}{2}$ S.	4 "
Solway outer buoy - - -	S.E. by E.	12 "
Workington - - -	S.E.	19 $\frac{1}{2}$ "
St. Bees lighthouse - - -	S.S.E. $\frac{1}{4}$ E.	22 "
King William banks buoy - - -	S. by W. $\frac{1}{2}$ W.	20 $\frac{1}{2}$ "

**Torr Lake Tide Light.**—There is a tide-light exhibited from a pole near Torr lake cottages. It shows *white* towards Little Ross and *green* towards Manxman sands, and is lit from half-flood to half-ebb from the 1st of September to the 30th of May.

From Great Ross head the rocky western shore extends N.N.E.  $\frac{1}{4}$  E. 3 miles to the bight called Millbay ; but at three-quarters of a mile from the point is the indenture half a mile deep of Balmangan bay, in which small coasters take shelter and lie upon the ground, moored to rings in the rocks, in south-westerly gales. At the head of the bay is a narrow neck of flat land connecting Great Ross with the rising ground within.

**Millton Sands and French Rock.**—Millton sand, forming the western boundary of the outlet of the Dee, extends from the north shore of Millbay in a south direction for 1 $\frac{1}{2}$  mile, and then with an upward curve connects with the high-water shore half a mile above Balmangan bay. The lower edge of the bank west of the channel is marked by one *black* buoy. French rock, in the bight outside Millton sands, and within two cables of the western shore of the bay, though out of the common track of vessels passing to and from the Dee, should nevertheless be guarded against, as it is seldom uncovered at low-water neaps.

**St. Mary Isle**, on which is the residence of the Earl of Selkirk, although formerly an island, is now connected with the main. Its south-west extreme is nearly 2 miles N. by E.  $\frac{1}{2}$  E. from Torr point, and its general direction is north-east; to the connecting neck of the peninsula it is a mile long, with an average breadth of one-quarter of a mile. It is covered by much fine wood, and about 200 yards off the south-western extreme is a small wooded islet called the Inch. At low-water, St. Mary Isle is surrounded by dry sands, gravel, and rock, and the channel of the Dee runs between it and the western shore of the bay.

The low-water mouth of the Dee is close under the east shore of the bay three quarters of a mile within Torr point. The channel runs in a N.  $\frac{1}{2}$  E. direction between the Manxman and Millton sands for the fish-house, a white cottage near the water's edge under Kirkcock hill, a distance of  $1\frac{1}{4}$  mile. From thence, the channel, running nearly along the edge of the western shore, is N.E.  $\frac{1}{2}$  E.  $1\frac{1}{4}$  mile to the sharp easterly bend of one-third of a mile to the town of Kirkcudbright; the breadth between the high-water shores being from three-tenths to one-tenth of a mile. Abreast the fish-house is a pool with 12 feet in it at low-water, and the low-water depth of the channel from within the bar to Kirkcudbright varies from 6 to 7 feet.

A little below the fish-house, on and within the point of high-water, are two perches, which kept in line leads up the centre of the channel.

Above Kirkcudbright the river winds for  $1\frac{1}{4}$  mile to near the ruin of Cumston castle on the right bank, where it divides, the northern stream or Tarf passing under a bridge at the Red Crae, half a mile up, the Dee continuing to the eastward under the bridge at Tongueland,  $1\frac{1}{2}$  mile above Kirkcudbright, up to which point small vessels reach at high-water. The crown of the arch of the latter bridge is 33 feet above the ordinary low-water level of the stream.

**TIDES.**—It is high-water, full and change, at Kirkcudbright, at 11h. 10m.; springs rise 23 feet, and neaps 14 feet. The flood stream reaches Kirkcudbright  $1\frac{1}{2}$  hour after low-water in the bay. At Tongueland bridge the tide is 10 minutes later, and the spring rise is 15 feet; the tide extends to half a mile above it. Off the bay the indraught of the flood will be felt at about one mile distant, where the general coast tide runs 1 knots on springs and 2 knots at neaps. Up the channel of the Dee the strength of the tide is  $3\frac{1}{2}$  knots at springs, it is much influenced, however, by freshes.

**Directions.**—The bay of Kirkcudbright affords the only low-water anchorage upon this coast for vessels of large size, and it is sheltered from all winds except those between S.S.W. and S.E. by E. The best roadstead is from 2 to 3 cables N.E. of the centre of Little Ross island, in  $3\frac{1}{2}$  fathoms

at low-water, good holding-ground. With the wind more southerly an uneasy swell is sent in.

The entrance of the bay is free of danger; the eastern shore and Little Ross island may be approached to one cable, and within, the depths decrease from 6 to 3 fathoms to abreast Torr point, half a mile north-westward of which a six-foot spit extends from Millton sands.

The Sound, or western channel into the bay, is not to be recommended, unless for a small vessel after half-flood, at which time there is a depth of 3 fathoms through it. The island side must be kept aboard, shoals on the opposite side being marked by Richardson rock, the apex of which is always uncovered.

In working within the entrance, French rock, which dries 6 feet at low-water springs, and has many large masses lying out from it, will be cleared to the south-eastward by keeping the pile on the summit of Great Ross outside Barr point, the north boundary of the entrance to Balmangan bay; and it will be cleared to the south-westward by keeping Balmae head outside of Torr point.

**The Bar** of the Dee, which is generally abreast the outermost perch on the eastern side of the entrance, has at most times 2 feet over it at low-water springs. In entering, keep the lighthouse and beacon on Little Ross in line, bearing S.W.  $\frac{1}{4}$  S.; pass a couple of ships' lengths to the westward of the outer perch, and then, rounding to the eastward of the *black* buoy, steer up with the perches near the fish-house in line, bearing about North, pass to the westward of the two perches from St. Mary isle, and then on to the pool before described.

South-west winds cause the highest sea on Dee bar; with southerly winds it is more protected, and from the eastward it is covered in, and vessels may then ride in smooth water under Torr point.

A vessel being at anchor in the bay, with an increasing wind and sea inwards, should endeavour to cross the bar at high-water, as the sea is then much fairer, and (if only requiring shelter) leave the two perches to the eastward, and enter Manxman's lake, where the water will be nearly smooth, and at low-water the vessel will lie on a bottom of sand and mud. Numerous coasters frequent this secure strand. The only accidents which occur arise from vessels not keeping close enough to the eastern shore in entering.

**Life-Boat.**—There is a life-boat for Kirkcudbright bay stationed east of the town.

**Kirkcudbright**, a royal borough, stands low on the eastern bank of the Dee,  $4\frac{1}{2}$  miles above Little Ross isle, and is a well and regularly built town. Vessels of 14 feet draught can reach and enter its small tidal dock

during springs. The trade consists of imports of coal and lime from Cumberland, and timber for the small vessels built here; while it exports corn and cattle to the English ports. Over the river a little above the harbour there is a level bridge on iron piles admitting the passage of vessels to Tongueland. A steam-vessel runs to Liverpool successively from Kirkcudbright, Garliestown, and Wigton, once a week from each place in summer, and once a fortnight in winter.

Kirkcudbright is connected with the Caledonian and Glasgow and South-western railways by a line to Castle Douglas,  $10\frac{1}{4}$  miles, and is distant from Dumfries 30 miles, and from Stranraer and Portpatrick  $63\frac{1}{2}$  and 70 miles. It is a creek of Dumfries.

The population in 1881 was 2,571.

### WIGTON BAY.

**EASTERN SHORE.**—Wigton bay is contained between Great Ross and Burrow head, which bear from each other nearly East and West  $11\frac{1}{4}$  miles. The bay is 13 miles deep to the narrows at Knockdown ferry, or 8 miles to the dry sands which fill up the inner portion of it, and below which no banks or dangers exist, except within a short distance of the shore on either side.

The coast from Great Ross point trends irregularly N.W.  $2\frac{1}{2}$  miles to Bareness point; between is the small inlet of Bridgehouse bay, which is bounded by shelving rocks, and has a small jetty on the southern side, at which, in fine weather, coasters discharge coal and lime. From Bareness a bold rocky coast, steep-to, especially at Muncraig heughs, extends N. by W.  $\frac{1}{2}$  W. for Kirkandrew bay.

**Kirkandrew Bay**, 4 miles from Great Ross point, is bounded by extensive ledges, and is unfit for anchorage, except in off-shore winds.

**Isles of Fleet.**—Barlocco island, the southernmost of a group of four, designated the isles of Fleet, is immediately to the northward of, and bounding, Kirkandrew bay; it is connected to the rugged shore by rocks, which are uncovered at low-water. The isle is low, one-quarter mile in extent N.N.E. and S.S.W., and the same distance from the shore, but the passage between is unfit for boats, except at high-water.

**Knockbrex Bay** is formed by the point of Bare hill and Barlocco island to the southward, and Knockbrex island to the northward; at low-water the margin is sandy, but the high-water boundary is rocky. Fair anchorage may be found in this bay with the wind from S.E. (easterly) to N.N.E., in  $2\frac{1}{2}$  fathoms, sand. Knockbrex island, about half a mile to the northward of Barlocco island, is nearly one-third of a mile in length, north-

east and south-west, and one-quarter of a mile broad, with an elevation of 90 feet; there is a house near its south-west end. The island is bold on the outer side, but is connected to the main at low-water by dry sand. On the north side some rocks, named Parton Craigs, show at low-water; and the channel within the island should not be attempted by strangers. There is very little tide stream within the island during either flood or ebb. On the north-east side of Knockbrex island is the little bay of Carrick, wherein a small vessel may take the ground in winds eastward of south, but it is not recommended.

**Murray Isles**, half a mile N.N.W. from Knockbrex island, are two in number, and separated by a rocky passage one-third of a cable in width; the southern one is about 200 yards long, by 100 yards in breadth, and is very low and rocky. The other island is one-quarter of a mile in length N.E. by E. and S.W. by W., and 200 yards wide: it is bounded by rocks, and is connected with the sands of Fleet bay at low-water. The bay between Knockbrex island and the Murray isles affords good anchorage with off-shore winds.

**FLEET BAY** is contained between the north point of Knockbrex isle and Ringdow point, an opening nearly  $1\frac{3}{4}$  mile across. The south-eastern shore, which is much broken, extends N.N.E. one mile to Craig More point, which is 40 feet high; it then holds more easterly (forming Aird bay), to a point abreast which Fleet bay becomes contracted to half a mile in width, and can be forded while a large stone on the north margin of the stream is discerned. From the north part of Aird point to Rough point is N.E. by E. three-quarters of a mile, and along this rocky shore the channel of the river runs at low-water. One-quarter mile eastward of Rough point is the beginning of an embankment, which, at the distance of half a mile, with a similar work on the north side, contracts the stream to a width of 40 feet. Half a mile farther, and at the same distance below Gatehouse bridge, is the shipping-place; the general direction up being N.E. by E.  $2\frac{1}{2}$  miles from Aird point to Gatehouse.

**Ringdow point**, on the north-western side of the entrance to the bay, is skirted by shelving rocks at low-water, and  $1\frac{1}{2}$  cable from it, S.S.E., are Carvellan rocks, the heads of which show at high-water. The shore runs up about E.N.E.  $1\frac{1}{2}$  mile to Cardonness point and obelisk, with a small islet lying 200 yards off it; it then rounds a small bay to the bridge of Skyreburn, opposite Rough point, and with a rocky shelving shore bounding the point of Ardwall on the eastern side of the indenture, connects half a mile above with the embankment before described.

The whole of Fleet bay, with the exception of the narrow and muddy channel of the issuing stream, is dry at low-water within a line passing



from the eastern side of the north Murray isle to Ringdow point. The entrance to the channel is one-quarter of a mile to the northward of the isle, and the best mark for it is the ruin of Gardonness castle, just open of the south-eastern shore of the bay, N.E. by E. Even a small vessel should wait until two-thirds flood before attempting the passage. Vessels drawing 12 feet can reach the shipping-place at springs.

**TIDES.**—It is high-water, full and change, at 11h. 15m.

**Fleetwater and Gatehouse.**—Fleetwater has its source in two streams, the larger one on the east side of a hill called the Cairns Muir of Fleet, which in a direct line is about 10 miles northward from Gatehouse. The town of Gatehouse, which is a borough, is situated upon the eastern side of the water, which is crossed by a stone bridge. There is a cotton factory, and vessels of about 60 tons get up the embanked channel.

The trade is small, being confined to a few cargoes of coal and lime.

The population in 1871 was 1,503. The nearest railway station is about 5 miles off.

From Ringdow point rocky shore extends N.W.  $\frac{1}{4}$  N.  $3\frac{1}{2}$  miles to Burnfoot; the land is high, generally well wooded, and is backed by a range of lofty hills, the highest of which, Cairnharrah, with an elevation of 1,477 feet, being N.  $\frac{1}{2}$  E.  $2\frac{1}{2}$  miles from Ringdow point. Near Ravenshill cliff is the conspicuous mansion of Kirkdale, and half a mile from Burnfoot, near to the shore, is the ruin of Carslooth castle, almost hid by trees. The best channel into the Cree is along the shore just described, which is free of danger at a cable off.

From Burnfoot, N.  $\frac{1}{2}$  W.  $1\frac{1}{2}$  mile, the shore is low, with a stony margin and a high background, to the granite quarries, where is a projection formed from the refuse of the works. The quarries are rented by the trustees of the Liverpool docks, and are worked very extensively. Abreast is a pool with 9 or 10 feet in it at low-water; there are two mooring buoys for securing vessels in it. The low-water channel, which runs close to the projection, is about 100 yards wide, and is bounded westerly by a tract of sand 2 miles across, dry at low-water.

**CREETOWN**, or Ferrytown-on-Cree, is situated near a small bight one mile above the quarries, having on an eminence at its south end a church with a square tower. The channel passes close to the sward in front of the town, and then runs obliquely over to the Wigton shore. The flood stream runs for about 4 hours in this neighbourhood. A ferry-boat crosses to Wigton at tide-time.

Creetown is a station on the Caledonian railway, 23 miles from Castle Douglas, and 6 miles from Newton Stewart; the population in 1871 was 805.

From Creetown, the shore, passing the woods of Barholm, trends northerly one mile to Knockdown horse-ferry, where the shores are only one-quarter of a mile apart. The ferry is at a pool having three fathoms in it at low-water, and which extends half a mile above the ferry-house, and for the same distance below it, with a width of 100 yards, and very steep shores. The rate of the tide stream near the ferry is at times 5 or 6 knots.

**River Cree**, which may be said to join the sea at Knockdown ferry, rises in two streams, one known as Cree proper, from loch Dornal, is of limited extent and size, the other near Eldrick hill in Ayrshire, a direct distance of 18 miles from the town of Newton Stewart. From loch Moan the stream takes a westerly circuit to the high bridge of Cree, above which it forms the division between Ayrshire and Kirkcudbrightshire, and below, between the latter county and Wigtonshire; salmon abound in the river, and in the month of March, the smelt is also taken in it.

For the approach to this river, see remarks upon Wigton sands, page 238.

From the outlet or entrance at the ferry the river trends N.W. by W. for one mile, and then N. by E. half a mile to the junction of the Palnure, an eastern tributary, which is crossed at a short distance by a bridge, where is a shipping-place admitting vessels drawing 12 feet on springs, and of 6 feet on neaps.

**Carty Quay**.—Above Palnure creek the river trends W.N.W. one mile with a width of 150 yards to Carty quay on the western bank. This, the uppermost shipping-place upon the Cree, is reached by small craft at tide-time.

A little above Carty quay the river is crossed by the Caledonian railway, which runs up towards the town by the west bank; and the stream, narrow and with steep muddy shores, winds for 3 miles to the bridge of Newton Stewart.

**Newton Stewart** is situated upon the river Cree, which is crossed by a handsome bridge  $6\frac{1}{2}$  miles above the ferry of Knockdown. The population in 1871 was 2,873, chiefly engaged in the manufacture of leather, and hand loom weaving. By rail the distance to Stranraer is  $23\frac{1}{2}$  miles, and to Castle Douglas  $29\frac{3}{4}$  miles.

**TIDES**.—At Carty quay, it is high-water, full and change, at 12h. 0m. Springs rise 12 feet, neaps 6 feet. Vessels of the same draught as at Palnure bridge are here received, viz., 12 feet at springs, and 6 feet on neaps. The tidal stream reaches about two miles above this, or within a mile of Newton Stewart.

**WESTERN SHORE**.—**Burrow Head**, the western point of the entrance to Wigton bay, as well as the eastern point of the entrance to Luce bay, is a bold well-marked cliff from every direction seaward. Off it

there is a heavy race when the ebb is opposed by a strong westerly wind. From the head, the lighthouse on the Mull of Galloway is W. by N.  $\frac{1}{2}$  N., 16 $\frac{1}{2}$  miles; lighthouse on Little Ross island, E.  $\frac{1}{2}$  N., 12 miles; and point of Ayre lighthouse, Isle of Man, S. by W.  $\frac{3}{4}$  W., 15 $\frac{1}{2}$  miles. The depths close off the heads to the eastward are from 5 to 10 fathoms.

From Barrow head a steep rocky shore extends E.N.E.  $1\frac{1}{2}$  mile to the entrance of Whithorn.

**ISLE OF WHITHORN**, so named from having once been an island, though it is now connected with the main, is a conspicuous little promontory, rendered more so by a white tower on its summit, the base of which is about 40 feet above high-water. The isle forms the eastern side of Whithorn bay, which is not more than one-sixth of a mile wide, and has a rocky circuit, besides being rather foul on the western side of the entrance. Here some ledges project from the shore and show at low-water. Two small detached masses, named the "Screenheads," lying out a short distance from the low-water margin, appear at the last-quarter ebb; they are marked by an iron beacon coloured *red*. The mark for clearing these rocks to the south-east is, Stein head, open east of Cairnharrah hill, bearing about N.E.  $\frac{3}{4}$  N.

The pier at the northern part of the isle admits vessels drawing 8 or 9 feet water inside it at half-tide, and at the pier-head those of 18 feet draught on springs and 10 feet on neaps. The shore dries about 3 feet off the pier-head.

**TIDES.**—It is high-water, full and change, at Whithorn, at 11h. 5m.; ordinary springs rise 18 feet, and neaps 13 feet.

**Directions.**—Screen rocks are steep-to, and the ebb stream sets directly upon them.

To enter the bay as far as the anchorage, keep the highest and most conspicuous house in the village, just over the pier-head, bearing N.  $\frac{1}{2}$  E.; good riding will be found with the wind anywhere between W.S.W., north about, and East, in from 2 $\frac{1}{2}$  to 4 fathoms at low-water, sand, but a heavy sea sets into the bay in southerly winds.

The harbour is a good one, certainly the best on the coast, as it affords earlier access as well as greater depth of water than the others; it is capable of holding a number of vessels.

**Life-boat.**—A life-boat is stationed at Isle of Whithorn.

A few vessels are here built and repaired: refreshments may be procured at the village.

Isle of Whithorn is a creek of Wigton. The population of the parish was in 1871, 459; it is 3 miles south-east of the royal burgh of Whithorn.

**YARROCK BAY.**—Stein head, close to and overlooking Isle of Whithorn, is a bold headland, with some rocks lying out one cable from its

base. A rocky fringe skirts the shore as far as Yarrock bay. This roadstead, immediately to the northward of Yarrock point, affords excellent shelter in westerly winds in 3 to 5 fathoms, sand; and there is cover for small craft farther in, from winds as far outwardly as south, when the anchorage in Garliestown bay is quite exposed.

**RIGG BAY** is 3 miles above Yarrock bay; off the intermediate coast is good anchorage with westerly winds in 6 and 7 fathoms, sand, and nearly clear of the influence of the tide-streams. About one mile from Yarrock bay is the small indenture called port Allan; north-easterly one mile from which is a bold point with the conspicuous ruin Cruggilton castle upon its summit; thence to Rigg bay the coast consists of cliff. This bay is nearly half a mile wide and deep, with a thickly wooded shore. In the centre of the bay the bottom is sand, but the south and north points are foul, particularly the latter, from which rocks extend S.S.E. one-quarter of a mile, several heads of the ledge always showing. From the north point of Rigg bay to Garliestown pier is N.N.E. half a mile, the shore in the interval being varied by the ornamental grounds of Galloway house.

**GARLIESTOWN** is on the west side of an inlet half a mile wide and deep; it is covered in to the eastward by Eggerness, which is clear of danger a cable off. The pier, which is south-eastward of the town, is the result of several extensions. The various cants from the shore are as follows:—S.E.  $\frac{1}{2}$  E., 230 feet; N.E.  $\frac{1}{2}$  E., 277 feet; E.S.E., 204 feet; and then N.E., 50 feet, to the head. The pier admits vessels drawing 18 feet alongside it during springs, and those of 10 feet at neaps. The space enclosed is sufficient for the berthage of about 20 vessels. There is a crane equal to lift 3 tons. When a vessel is expected, or observed off the harbour, a light is exhibited at night and a flag in day from the head of the pier.

The low-water shore of the bay is composed of sand and stones, and more westerly of large stones and rock. A perch marks a rocky patch on the western side of the bay, with several large stones outside it that dry at low-water. In the middle of the bay, about half a cable outside the low-water margin, is also a small rock which dries 2 feet at low-water springs; there is 8 or 9 feet in the passage between it and Eggerness, and 3 or 4 feet towards the low-water shore on the western side.

Little Ross lighthouse, kept just open of Great Ross, S.E. by E.  $\frac{1}{2}$  E., will lead directly towards the harbour. In approaching the pier pass half a cable outside the perch, from whence it dries at low-water in a direction towards Eggerness. In off-shore winds good anchorage will be found one-third of a mile to the south-eastward of the perch, but, as is the case with

the other roadsteads on the west side of Wigton bay, a heavy swell is sent home in southerly and south-easterly winds.

Several vessels belong to the port, the trade of which consists principally of imports of coal, lime, manure, and timber, and exports of grain, cattle, and fish. A steam-vessel runs to Liverpool successively from Garliestown and the other ports in the neighbourhood. Ship-building is carried on to some extent.

Garliestown is a creek of Wigton custom-house.

The population of the village in 1871 was 683.

**WIGTON SANDS.**—From Eggerness a rocky and well-wooded shore extends one mile to Innerwell point, or port McGean, where is a considerable salmon fishery. Then the coast, still well-wooded, trends north-westerly for  $2\frac{1}{4}$  miles to Orchardtown bay, when, assuming a flatter character, it holds N.  $\frac{3}{4}$  E. for  $2\frac{1}{2}$  miles to the outlet of Bladenoch river near the town of Wigton.

Wigton sands, dry at low-water, occupy the whole of the space within a line joining Innerwell point and Carslooth castle on the opposite shore. Abreast Orchardtown bay are three detached sands, the outer and easternmost of which, just awash at low-water, has a spit, with 3 and 4 feet upon it, extending one mile to the south-eastward, or until Ringdow point at the entrance of Fleet bay bears E. by S.

A depth of 12 feet outside Wigton sands occurs with Borgue church, over the north-east end of Barlocco island, bearing E.S.E., and no vessel waiting tide to enter the Cree should go within this boundary. As the nature of the shores at the head of Wigton bay do not admit of any distinct leading marks being given, vessels drawing 8 or 9 feet should wait until after half-flood before attempting to enter the Cree.

**Wigtown, or Wigton,** a royal burgh, and also a county town, stands in a commanding situation upon an eminence, the white steeple of its gaol being a conspicuous object. Wigtown is by the road  $7\frac{1}{4}$  miles from Newton Stewart, which is the nearest railway station; 11 from Whithorn; and 20 east of Stranraer; it has no manufactures, and the trade consists in the supply of an agricultural district, and the export of its produce. There is steam communication about once a fortnight with Liverpool and ports on the Galloway coast. Wigtown is a custom-house port, and the returns for 1882 were as follows:—coasters, inwards, 551=29,230 tons; outwards, 540=28,468 tons: foreign, inwards, 2=367 tons; outwards, 1=151 tons.

Number of vessels belonging to the port, 33=1,341 tons.

The population in 1881 was 1,722.

Half a mile to the southward of the town is the outlet of the river Bladenoch, a considerable stream, with a very winding south-eastern

course of 24 miles, and at the village is a noted whiskey distillery; small vessels enter at tide-time. The first bridge is  $1\frac{1}{2}$  mile above the entrance. The river, in which salmon are plentiful, joins the sea by several channels through Wigton sands.

Above Wigton a flat marshy shore extends to the E.N.E. for 2 miles, and then N.E. by N. for one mile to abreast Knockdown ferry.

**GENERAL REMARKS and Soundings.**—In Wigton bay the bottom is clean and the depths are regular, decreasing gradually from 16 and 14 fathoms, over sand, from the line between the heads, to 3 or 2 fathoms near Wigton sands. The various anchorages around the bay, as already mentioned, afford good shelter in off-shore winds, but a heavy sea sets into it with southerly winds, which are very prevalent, and often give but little warning. A vessel caught suddenly under such circumstances within the bay should endeavour by every means to hang off until tide-time, and then enter Garliestown or the river Cree, as may appear most desirable.

**Tidal Streams.**—The flood stream begins to set into Wigton bay round Burrow head 2 hours before it is low-water by the shore, taking a direction across the bay towards Muncraig heughs, or the Borgue land; but beyond the centre of the bay, the direction is more outwardly towards Great Ross point.

Within the line of the heads the ebb stream sets to the westward across the bay 2 hours before it is high-water by the shore. The greatest velocity is 4 knots on springs and 2 knots on neaps.

The flood stream sets into the river Cree after one hour of flood by the shore; abreast Creetown it continues 5 hours, and the ebb stream 7 hours, the average rate being 5 knots on springs and 3 knots during neaps.

The above times are materially influenced by the wind, and above Creetown the strength is also affected by the river freshes.

#### LUCE BAY.

Luce bay, named from a river which discharges at its head, extends far into Wigtonshire in a northerly direction; it is contained between Burrow head and the Mull of Galloway, is 16 miles across at the entrance on a bearing from the former of W. by N.  $\frac{1}{4}$  N., and has a mean depth of 14 miles.

**EASTERN SHORE.**—From Burrow head the general direction of the coast for  $4\frac{1}{2}$  miles is N.W.  $\frac{1}{2}$  N., then N.N.W.  $\frac{1}{2}$  W. 11 miles for Synnyness, and from thence to the outlet of the river, 3 miles farther, about N. by W.  $\frac{1}{2}$  W. A bold coast steep-to extends N.W. by N. for 2 miles from the head to the small indents called ports Castle and Cunan, where a

high-water shingle beach begins, with a steep bank, backed by the high-lands of Glasserton, which have an elevation of 460 feet. The frontage continues of the same character to Lagg bay and point; the former is only to be used in off-shore winds. Two cables off the point some large stones appear at low-water.

**MONRIETH BAY.**—It is N.N.W.  $\frac{1}{2}$  W.  $1\frac{1}{4}$  mile from Lagg point to Barsalloch point; between them is Monrieth bay, one-third of a mile in depth, with high shores; it affords good shelter with the wind from N.N.E. (easterly) to S.E. A vessel may anchor in about 3 fathoms at low-water by keeping the southern land one-quarter point open of Lagg point, and the highest part of Barhullion fell (which is elevated 429 feet above high-water) bearing E. by N. With the exception of some fine sand under the village of Monrieth, the low-water margin of the bay is stony.

**PORT WILLIAM.**—From Barsalloch point to the small harbour of port William the trend of the coast is north about  $1\frac{1}{2}$  mile; the high-water boundary being flat, with a steep bank a short distance within. Port William, the only place on the east side of Luce bay which affords any shelter with the wind from the southward, has a good pier, which covers in well from the prevailing south-westerly and southerly winds; at spring tides the water ebbs 5 feet from its head, outside which is a warping buoy. The enclosed space will contain about a dozen small craft. Vessels of 12 feet draught can enter on springs, and those of 8 feet on neaps. A vessel of 8 feet draught may enter at two-thirds flood; and at night, if a vessel is known to be off the port, a light will be shown from the pier-head. A considerable quantity of grain is shipped from this place.

**TIDES.**—It is high-water, full and change, at port William, at 11h. 10m.; equinoctial springs rise 22 feet, ordinary springs 18 feet, and neaps 10 feet.

**Anchorage.**—Good anchorage will be found in off-shore winds, in 4 fathoms, one-third of a mile from the pier, with the head of it bearing east.

Port William is a creek of Wigton.

**COAST.**—From port William, the coast extends N.N.W.  $\frac{1}{2}$  W. for  $5\frac{1}{2}$  miles to Garheugh craigs, which are foul off. The intermediate shore is of the same character as described to port William, and the low-water breadth is about  $1\frac{1}{2}$  cable; the same feature continues N.W.  $\frac{1}{2}$  W. for  $2\frac{1}{4}$  miles to Synnyness, a bluff head steep-to, and elevated 222 feet above high-water. In Auchenmalg bay, just to the eastward of the latter, anchorage may be taken with the wind off-shore, in 4 fathoms, one-third of a mile from the shore.

From Synnyness the coast, bold and rocky, continues N.W. by N., and then north,  $1\frac{3}{4}$  mile to the small bay of Kilfillan, where is excellent anchorage with the wind from north (easterly) to south-east. The most conspicuous hilly feature is the Knock of Luce, elevated 546 feet, N.E. by E.  $2\frac{3}{4}$  miles from Synnyness; also, within Garheugh craigs, Doon of May, and Mochrum Fell, the latter 628 feet above high-water.

**LUCE WATER.**—The shore from the north point of Kilfillan bay bends about one mile to the low point forming the eastern side of the entrance to Luce water, the outlet being divided by a small islet. The first bridge across the Luce, which is seldom reached by the tide, is one mile from the entrance, and the source of the water is in two principal streams from a northern direction about 15 miles in a direct course. The church of Glenluce is on an eminence one-third of a mile to the eastward of the bridge. At low-water springs the sands are uncovered for the breadth of a mile opposite the entrance of Luce water, and here small vessels lie in fine weather and discharge their cargoes.

Glenluce is a railway station distant 14 miles from Newton Stewart, and 9 miles from Stranraer. The population in 1871 was 899. On the left bank of the river are the ruins of Glenluce abbey.

Pillantoun burn has a common outlet with the Luce at low-water, and sand-hills skirt the high-water shore between the streams. Small vessels discharge coal at the entrance to the burn near a ford, which may be safely crossed at low-water. Dunragget hill, on which is a flag-staff 225 feet above high-water, is a well-marked object two miles distant inland.

**WESTERN SHORE.—MULL OF GALLOWAY,** the south point of Scotland and the western boundary of the entrance to Luce bay, is a bold precipitous headland elevated 258 feet above high-water; it is bold-to at all parts, and may be approached with confidence. ~~The Mull which is a small island~~

**ERRATUM.**—Page 241, line 7 from bottom, *for* “about Killyness,” *read* “the bearing S.E.  $\frac{1}{2}$  E.”

E 5345a. 1200.—5/84. Wt. 2554.

happened that in hazy weather, with the clouds low about the head, it becomes obscured, and vessels supposing themselves to be to the westward of it, have run into Luce bay and become wrecked upon the sands at its head.

Ru 5345.

Q



The following bearings and distances are from the lighthouse :—

Chicken rock lighthouse, Calf

of Man	-	-	S. by W. $\frac{7}{8}$ W.	-	36 miles.
South rock	-	-	W. by S. $\frac{1}{4}$ S.	-	24 $\frac{1}{2}$ "
Copeland lighthouse	-	-	N.W. by W. $\frac{1}{8}$ W.	-	24 "
Port William	-	-	E. by N. $\frac{1}{2}$ N.	-	12 $\frac{1}{4}$ "
Great Scare rock	-	-	E. $\frac{3}{8}$ S.	-	5 $\frac{3}{4}$ "
Burrow head	-	-	E. by S. $\frac{1}{8}$ S.	-	16 $\frac{1}{2}$ "
St. Bees head lighthouse	-	-	S.E. by E. $\frac{1}{4}$ E.	-	43 $\frac{1}{2}$ "
Point of Ayre lighthouse, Isle of Man,	-	-	S.S.E. $\frac{3}{4}$ E.	-	21 $\frac{1}{2}$ "

**EAST TARBAT BAY** has the Mull of Galloway as a natural breakwater with the wind from the southward, and at such times is the most secure position within Luce bay. A storehouse and landing-place for the lighthouse are at the head of the bay. The best anchorage will be found with the storehouse bearing West, one-quarter of a mile, in 3 $\frac{1}{2}$  or 4 fathoms; here is good shelter with the wind as far outwardly as S.S.E., and the tide stream will scarcely be felt.

From East Tarbat bay the shore trends N. by E.  $\frac{1}{2}$  E. 1 $\frac{3}{4}$  mile to Maryport, and then N.E. by E.  $\frac{1}{2}$  E. one mile to Killyness, which is low and the first projection seen in Luce bay on rounding the Mull, from which it bears N. by E. 2 $\frac{3}{4}$  miles. Many large stones show at low-water more than a cable outside the point.

**DRUMMORE.**—From Killyness the coast has a N.N.W. direction for one mile to Drummore quay, and is skirted with stones, which lie a cable out at low-water. Drummore bay has clean sand at its low-water boundary, and affords good anchorage with the wind from S.S.W., westerly, to North, in 2 $\frac{1}{2}$  fathoms low-water, with the pier bearing S.W. The bottom throughout the bay is fine sand. The pier, built under the shelter of a point below the village, will receive small coasters drawing 8 feet towards high-water; but it is much encumbered by a tank of shingle which the sea has thrown up during southerly and south-easterly winds: this ridge is scarcely covered at high-water, and fears are entertained that it will eventually prove a serious detriment to the place. The trade consists of an import of coal, and exports of grain.

From Drummore quay the general direction of the coast to Sandhead is N.  $\frac{1}{2}$  E. 7 $\frac{1}{4}$  miles, and includes the following places :—

**NEW ENGLAND BAY**, 2 $\frac{2}{3}$  miles from the quay, Grenan craigs being the only cliffty portion of the track. The bay, which is skirted by large stones near the low-water shore, and enclosing a margin of sand, affords good anchorage with off shore winds, in 4 or 5 fathoms.

**CHAPELROSSAN BAY**, 1 $\frac{1}{2}$  mile from New England bay, affords excellent shelter in westerly winds, in 2 $\frac{1}{2}$  fathoms, sand, with the

Mull lighthouse showing just over Drummore point. The south point is rocky and the north point stony, and there are also some patches of stones with 8 and 10 feet over them skirting the bay, so that anchorage should not be taken up within the above limit.

From Chapelrossan bay it is  $1\frac{1}{4}$  mile to Ardwell mill, on the south point of Sandhead bay. There is also good anchorage in this bay one mile E.  $\frac{1}{2}$  S. from the mill, in  $4\frac{1}{2}$  fathoms.

The head of Luce bay, 6 miles across and contained between Sandhead and Kilfillan bays, has a high-water margin of sand-hills and a sandy foreshore, which dries on the average half a mile out at low-water. The depths towards this strand are regular, but it must be almost needless to say that a heavy sea bursts upon it shortly after a southerly wind has set in.

**SCARE ROCKS.**—These remarkable objects, situated in the middle of the entrance to Luce bay, are the only dangers outside the distance of one-quarter of a mile from the bounding shores.

Great Scare, bearing from the Mull of Galloway lighthouse, E.  $\frac{3}{4}$  S.  $5\frac{1}{2}$  miles; from port William, S.W. by W., 7 miles; and from Burrow head, W. by N.  $\frac{1}{2}$  N.,  $10\frac{1}{2}$  miles; is elevated 70 feet above high-water. It is a bare rock without the slightest trace of vegetation upon it, and is bold all around at the distance of half a cable.

Little Scare consists of a small cluster of rocks N.E.  $\frac{1}{4}$  E. two-thirds of a mile from the Great Scare, three of the heads or summits being always uncovered. There are several detached rocks about them, but all will be cleared by passing at the distance of a cable from the highest rocks. In the channel between the Great and Little Scares there are depths of 10 and 11 fathoms.

**TIDES.**—At the Mull of Galloway, it is high-water, full and change, at 11h. 15m.; the approximate rise is 15 feet on springs, and 12 feet on neaps.

**Race.**—From the advanced position of the Mull and the consequent concentration of the tide streams, aided perhaps by the character of the bottom near it, there are dangerous races and overfalls extending for 2 miles off, especially when the tide streams are opposed by strong winds. During the flood the direction of the race is from the Mull towards Synnyness, and during the ebb it is close in round the Mull to the north-west. On such occasions a berth should be given of at least 3 miles from the shore. The tide streams run with considerable rapidity close to the rocks.

The tides in Luce bay have a similar motion to the streams in Wigton bay. For instance, the flood stream sets to the eastward round the

Mull into Luce bay 2 hours before it is low-water upon the shore, and continues so until 4 hours flood; it then turns, runs westerly, and continues in that direction until 4 hours ebb, the general direction in the latter case being from Synnyness towards the Mull. The rate at springs is 4 knots, and at neaps 2 knots; in the north-west portion of the bay, however, the rate of both streams is very gentle. At the Scares, the flood stream sets direct for Burrow head, and the ebb for the Mull of Galloway.

**GENERAL REMARKS and Soundings.**—Luce bay is exposed to an indraught due to the prevailing southerly winds, and the becoming embayed is justly dreaded by vessels passing in its vicinity or using the small ports around it. Southerly winds prevail in it for nine months in the year, and it is difficult for a small vessel to work out against the sea which is sent home on such occasions.

As has been already remarked, the bay is free from low-water dangers, except close in-shore, and the bottom is fine sand, except about the Scares where it consists of gravel and rock. The soundings between the heads are from 20 fathoms at one mile off the Mull, to 12 and 14 fathoms abreast the Scares, increasing to 17 and 15 fathoms towards the same distance from Burrow head. From Drummore across to port William to one mile from the head of the bay there is a general depth of from 8 to 5 fathoms.

In westerly winds, a vessel bound round the Mull may make use of East Tarbat bay, or lie to under the land, while the flood stream is running.

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## CHAPTER VIII.

## ISLE OF MAN.

## VARIATION IN 1884.

South-east side -  $21^{\circ} 5' \text{ W.}$  | North-west side -  $21^{\circ} 25' \text{ W.}$

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**GENERAL DESCRIPTION.**—The Isle of Man \* is situated in the northern portion of the Irish sea; it is 26 miles west of England between St. Bees head and the point of Ayre;  $15\frac{3}{4}$  miles south of Scotland between Burrow head and the same point;  $27\frac{1}{2}$  miles east of Ireland between the point west of South rock, and Contrary head; and 39 miles north of Wales between Llanlana head, Anglesea, and the Calf. Its extreme length (including the Calf) is 28 sea or  $32\frac{1}{2}$  statute miles, in a N.E. by E.  $\frac{1}{4}$  E. and S.W. by W.  $\frac{1}{4}$  W. direction; its greatest breadth is about 10 sea or  $11\frac{1}{2}$  statute miles, and it has 80 sea miles of coast line, the contained area being about 140,000 statute acres. Seen from a distance, the general aspect of the island is rather tame, for though the mountains which extend nearly through its entire length are of considerable altitude they do not tower up with sufficient abruptness to assume picturesque forms. The highest point of the range is Snaefell, or Snæfield,† which is 2,034 feet above high-water; and many of the other summits range from 1,500 to 1,800 feet in height.

The mountains and hills occupy a considerable portion of the surface of the island, and are chiefly composed of clay slate, containing some beds of roofing slate, varied by masses of granite. At the south-west end of the island, from Poyll Vaaish to Derby haven, mountain limestone rests upon the slate, but is separated from it by a bed of conglomerate. The middle of the island is occupied by a low hollow or valley extending from Douglas to Peel, and a similar flat is to be found at the south-west end of the island between Derby haven and Bradda head. The north-east end is flat, and is generally composed of alluvial soil. There are mines of copper and lead, the latter producing a considerable amount of silver. The principal are those of Laxey on the eastern coast, and Foxdale, south of the road from Douglas to Peel; the former are the most productive, and employ about 600 hands.

The island is well watered, numerous streams and rivulets issuing from the sides and bases of the hills. Some of the valleys are tolerably fertile in pasture, and where the ground is somewhat level grain is cultivated. There

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\* See Admiralty chart of the Isle of Man, No. 2,094; scale,  $m = 0.8$  inch; Carlingford lough to Lanre lough, No. 45; scale,  $m = 0.5$  inch.

† From the Norse *snaer*, snow, and *faeld*, a hill.

is little wood, but there is more in the northern district of the island than elsewhere. The climate is mild and the temperature equable; the mean rainfall does not exceed 26 inches in the year, although the number of days on which rain falls is considerable, and in spring and autumn the island is visited occasionally with a continuance of cold east winds.

Man was formerly one of the principal seats of the herring fishery, and though the island is at times comparatively deserted by the herring shoals, the fishery is still a considerable one, employing from three to four hundred boats. The principal exports are fish, agricultural produce, lead ore, some paper, linen, and sail cloth; and the imports spirits, wines, colonial produce, and manufactured goods.

It appears from the shipping returns for 1882 that 2,559 vessels, amounting to 415,939 tons, arrived at, and 2,561 vessels, of 412,891 tons, sailed from the various ports, in the island during the year; while 201 vessels of 12,567 tons belonged to the island.

It is probable that the island was originally peopled by roving Gaelic tribes, as their language and the Manx have but a slight dialectic difference. In early times the sovereignty passed repeatedly between the Scots, the Welsh, and the Norse, the latter holding the longest dominion until it passed into the hands of Sir John Stanley in 1406; from that date until 1736 the island was held in feudal sovereignty by the Stanley family, afterwards Earls of Derby; in the latter year, failing issue, the possession fell to the Duke of Atholl, a descendant through a female branch. In 1765 the royalty of the island was sold to the Crown, and in 1829 all remaining interests were likewise disposed of, and the connexion of the Dukes of Atholl with the island terminated. The population in 1881 amounted to 53,492.

A description will first be given of the eastern side of the island from the Calf of Man to the northward, and then of the western side from the point of Ayre to the southward.

**CALF OF MAN**, off the south-western extremity of the island, and separated from the latter by Calf sound, is irregular in outline, about one mile in length and breadth, and with an area of rather less than 600 acres. The highest part of the Calf is 360 feet above the level of high-water; it is partly cultivated, has one farm-house upon it, and has two landing-places, North and South havens, connected by road with the farm and disused light-houses. The tenant makes a large portion of his rent by the sale of rabbits, which are numerous.

Two light-towers of stone stand close to the cliff at the western angle of the island but the lights have been discontinued since the erection of the light-house on Chicken rock.

From North haven, where the shore is low and rocky, the coast trends N.W. by W. for one-third of a mile to Jubdale creek or bay, an open and

exposed bight running in south-westerly for a cable, after which the coast for three-quarters of a mile trends westerly and west-south-westerly to the Stack, the whole of the shore consisting of precipitous cliffs varying from 100 to 350 feet in height.

**The Stack**, a small rocky islet off the disused low light-house, is 107 feet in height, in the boat passage separating it from the Calf is a sunken rock, and another rock, uncovered at low-water, lies out 50 yards from its north end.

From the low light-house, the cliff extending S.  $\frac{1}{4}$  W. for two-thirds of a mile declines in height to Caigher point, between which and Burrow cliff, S.E.  $\frac{1}{4}$  E., one-third of a mile from it, is an irregular indentation which is occupied for a cable from the shore by rocks which uncover at the last-quarter ebb. Nearly midway, also, between the low lighthouse and Caigher point, are two rocks lying out about one cable from the shore, with two fathoms over them at low-water.

**Burrow Cliff**, bold and rocky, 120 feet high, and appearing like an island from being connected to the Calf by an isthmus which covers at high-water, is sometimes called the Eye, from its being completely perforated. Three rocks, covered at high-water, the Clets of the Burrow, lie out half a cable from the cliff in a S.S.E.  $\frac{1}{4}$  E. direction. In the small cove to the westward of the isthmus,  $1\frac{1}{2}$  cable deep and half a cable broad, with 3 to 10 fathoms in it at low-water, fishing vessels occasionally obtain shelter in strong northerly winds.

From the Burrow to Thick head is N.E.  $\frac{3}{4}$  E. nearly a mile, at the head the cliff is 250 feet in height, but it declines from thence towards North haven. At  $2\frac{1}{2}$  cables to the north-eastward of Thick head, are six rocks, the Clets of the Sound, which cover at three-quarters flood.

**CHICKEN ROCK**, to the south-westward of the Calf, has the disused lighthouses in line N.E.  $\frac{1}{4}$  N. one mile distant, and Burrow cliff E.  $\frac{1}{8}$  S. about the same distance; it is a single rock, with two summits, 5 or 6 feet above high-water springs, divided by a deep fissure, and is wholly uncovered at low-water. Depths of 4 to 9 fathoms are to be found close to this rock, and 11 to 24 fathoms in the channel separating it from the Calf.

**LIGHT.**—A light-house, built of light-coloured granite, and 143 feet high, stands on Chicken rock in lat.  $54^{\circ} 2' N.$ , long.  $4^{\circ} 50' 45'' W.$ , from which is exhibited a *revolving white* light showing a *flash every half-minute* at an elevation of 122 feet above the level of high-water, and which in clear weather should be seen at the distance of 16 miles.

**Fog Signal.**—In thick or foggy weather a bell is sounded at intervals of *half a minute*.

The following bearings and distances are from the lighthouse, viz. :—

Skerries, near Holyhead	-	S. $\frac{3}{4}$ W.	-	38 miles.
Kish light-vessel	-	S.W. by W. $\frac{1}{2}$ W.	-	59 "
St. John's lighthouse	-	N.W. $\frac{1}{2}$ W.	-	31 "
Copeland lighthouse	-	N. $\frac{7}{8}$ W.	-	46 $\frac{1}{2}$ "
Mull of Galloway	-	N. by E. $\frac{1}{2}$ E.	-	36 "
N.W. light-ship, Liverpool bay	-	S.E. by S.	-	56 $\frac{3}{4}$ "

**CALF SOUND**,\* the passage between the Calf and the Isle of Man, is considerably narrowed and obstructed by the small island of Kitterland and its surrounding ledges, as well as by Thousla rock projecting from the Calf near North haven. Upon this latter danger, which is covered at three-quarters flood, has been erected an iron beacon, surmounted by a barrel-shaped cage, painted *red*, and elevated 25 feet above the level of high-water springs.

In approaching the sound from the southward, with Kitterland island bearing North, 1  $\frac{1}{2}$  mile distant, a small bank called the Wart, will be crossed with 6 to 10 fathoms upon it, and upwards of 20 fathoms about it. The southern entrance of the sound is bounded by the precipitous cliffs of Thick head and Spanish head, respectively, 300 feet and 338 feet above high-water; between them the depth is 10 to 12 fathoms. Spanish head received its name from the fact that several of the ships of the Spanish Armada were dashed to pieces upon it. Kitterland island is covered with grass, and Thousla rock is well marked by its beacon. The general course through the sound is N.  $\frac{3}{4}$  E., it has a depth of 9 fathoms in the deepest track, but the unobstructed way is not more than half a cable wide at low-water, as a rock, with only 6 feet over it, lies out 70 yards from the west side of Kitterland.

**TIDES.**—It is high-water at the Calf, full and change, at 11h. 17m. Equinoctial springs rise 20  $\frac{3}{4}$  feet, ordinary springs 16  $\frac{1}{2}$  feet, and neaps 12  $\frac{3}{4}$  feet.

From Spanish head the tide sets directly towards Thick head, and from thence over the Clets of the Sound; the northern stream, on the contrary, passes from between Thousla rock and Kitterland island over the outer Clet, and is from thence deflected towards Spanish head. The general rate of the streams in the sound is 4 knots on springs, and 2 knots on neaps.

The flood stream in the sound runs to the southward until 1h. 53m. before high-water by the shore, when it changes to the northward, while the ebb stream sets to the northward until 2h. 27m. before low-water by the shore, when it changes to the southward.

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\* See plan of Calf sound, on Admiralty chart No. 2094.

Along the north side of the Calf to as far as the Stack, the stream runs 9 hours to the westward, at the average rate of one knot per hour.

The stream past Chicken rock runs at the rate of  $4\frac{1}{2}$  knots at springs, and  $2\frac{1}{2}$  knots at neaps; but within the rock, along the Calf shore from the Stack to Burrow cliff, there is but little stream.

About 5 miles south-west of the Calf, the flood and ebb streams set S.E. by E. and N.W. by N. at the rate of half a knot; and farther out, more towards the north-west, there is scarcely any perceptible tide.

**Directions.**—It is evident that the passage through the sound should only be used in case of necessity, and when a special reason exists for avoiding the longer round southward of Chicken rock.

The only direction that can be given is to keep the Calf aboard at a fair berth, after passing the Cleets, and afterwards to maintain a mid-channel track between the beacon and Kitterland island.

**POYLL VAAISH BAY.**—Spanish head is E.  $\frac{3}{4}$  N.  $1\frac{1}{2}$  mile from Burrow cliff, and from thence the coast runs nearly in the same direction  $1\frac{1}{2}$  mile for Kallow point. Poyll Vaaish bay is contained between Kallow point, near port St. Mary, and Scarlet point, it is about  $2\frac{1}{4}$  miles wide and one mile deep, with a general depth of 12 fathoms along the line between the embracing points; it is directly open to the southward, and has but indifferent holding-ground, from the presence of numerous patches of rock and coral over its whole extent. The low and uneven shores are skirted for a breadth of one-quarter of a mile, on the average, by rocks and large stones, with the exception of a small sandy bight in the north-west corner.

**Carrick Rock** occupies the centre of the bay nearly; it is 500 yards long and 160 yards wide, dries 14 feet at low-water springs, and is, consequently, covered at two-thirds flood. About the distance of one cable off its eastern end, is a sunken rock with only 4 feet over it.

The Carrick is cleared to the south-westward in 4 fathoms by keeping the extremity of Langness, on which is a lighthouse, open of Scarlet point Stack, bearing about S.E.  $\frac{3}{4}$  E.; and it is cleared to the southward in a similar depth, by keeping the tower of King William college in line with, or outside, Castletown windmill, E.  $\frac{3}{4}$  S. At night, the *red* light on the hill upon the west side of port St. Mary kept in line with the *white* light on the pier-head will clear the Carrick to the south-west.

**Anchorage.**—Vessels, while waiting tide to enter port St. Mary in winds from W. by S. (north about) to E.S.E., usually anchor upon the western side of the bay in a bight off port St. Mary point; where, in 3 fathoms over gravel, the marks are, the chimney of Connal's brewery, bearing N.N.E.  $\frac{3}{4}$  E.; and the lighthouse on St. Mary pier-head, N.W. by



W.  $\frac{1}{2}$  W., a quarter of a mile distant. The holding-ground, however, is not good, and a heavy sea is sent in with winds between south-west and south-east. It is principally frequented in the summer season by smacks of 70 to 90 tons burden, and by the herring vessels. These latter, by getting well inside the point, obtain sufficient shelter to enable them upon the wind shifting in, to hold on till there is sufficient water to enter the harbour.

**PORT ST. MARY.\*** The small tidal harbour in the north-west corner of Poyll Vaaish bay, has been much improved of late years, and is covered in by a pier extending out for more than a cable in a N.E. by N. direction. The harbour is quayed at the head and upon the west side, and the passage into it, between the pier-head and the ledges from the shore, is about 200 feet wide. Vessels of 12 or 13 feet draught can enter on spring tides, and those of 8 or 9 feet on neaps; it shoals gradually towards the head of the harbour. The area is rather more than 2 acres, over a bottom of mud and clay, and it has a crane equal to a lift of 10 or 12 tons.

**LIGHTS.**—A white octagonal lighthouse stands on the outer end of St. Mary pier, from it a *fixed white* light is shown all night at a height of 25 feet above high-water, visible at the distance of 9 miles in clear weather.

A *fixed red* light is placed at 36 feet above high-water on the hill upon the west side of the port; this light kept in line with the pier light clears Carrick rock to the south-west.

When Carrick rock is covered, there is a depth of 7 feet at the entrance to port St. Mary. In entering, beware of the low ledges which extend out 2 cables from St. Mary point, and round into the harbour as close to the lighthouse as circumstances will permit, but no stranger should willingly attempt it without a pilot.

When not employed in agriculture, the inhabitants of port St. Mary spend most of their time in fishing for cod, herring, and lobsters, which latter are principally exported.

Port St. Mary is a creek of Castletown.

**TIDES.**—It is high-water, full and change, at port St. Mary, at 11h. 10m.; ordinary springs rise 22 feet, neaps 18 feet; there is very little stream of tide in any part of the bay.

**CASTLETOWN BAY**, contained between Scarlet point Stack and Langness, the latter bearing S.E., and from Burrow cliff E. by S.  $\frac{1}{2}$  S.  $6\frac{1}{2}$  miles, is  $1\frac{1}{4}$  mile wide, and rather more than one mile deep.† The

\* See plan of port St. Mary, on Admiralty chart No. 2094.

† See plan of Castletown bay, on Admiralty chart No. 2094.

depth at the entrance varies from 5 to 13 fathoms, over a rocky and uneven bottom; and, with the exception of the south-eastern portion, the whole bay is occupied by rocky and foul foreshores, and sunk ledges.

**Lheeahrio Rock**, the outermost and longest of the detached masses upon the north-western side of the bay, is 2 cables long and one cable wide, of irregular form, with many fangs lying out from it; the top of it is just awash at high-water neaps.

**Buoy.**—Lheeahrio rock is marked on the outside, or to the south-eastward, at the distance of two thirds-of a cable, by a *black* buoy in 3 fathoms at low-water; at it, Castle Rusheen flagstaff bears north; the Stack, W. by N.  $\frac{1}{4}$  N.; and Langness land-mark, S.E.  $\frac{3}{4}$  E.

The bay, from being directly open, from its foul bottom, and the confused currents in its neighbourhood, is an unsafe anchorage, and it is, consequently, but little resorted to, except by those thoroughly acquainted with it. The anchorage usually taken up is in 7 to 10 fathoms, over a patch of gravel and sand,  $1\frac{1}{2}$  cable to the south-eastward of the buoy, with Spanish head, just open of the Stack, W. by N.  $\frac{3}{4}$  N.; Rusheen castle, N.  $\frac{3}{4}$  W.; and the outer extremity of Langness, S.  $\frac{1}{2}$  E. In working in for this anchorage, be careful not to shut Spanish head in behind the Stack until to the eastward of the buoy, or until the lighthouse upon Castletown pier-head bears North.

**Castletown**, though the capital of the island and the seat of Government, is, neither in size nor importance, to be compared to Douglas. The principal building, Castle Rusheen, built by the Danes in 947, is kept in thorough repair, and is the only fortress upon the island. It is quadrangular, and flanked with towers on each side, the northern or flag-tower rising to the height of 80 feet, the whole being surrounded by an embattled wall and fosse, and by a glacis of stone; in the castle is a court-room and other government offices. The octagonal tower of St. Mary chapel is also a prominent object. About two-thirds of a mile east of the castle is King William college, standing a little within the shore at the head of the bay, and the most conspicuous object upon the southern side of the island. It was founded in 1830 for the education of young men to supply the Manx churches; the building, in the Elizabethan style, is a spacious cruciform structure, with an embattled tower, 115 feet high, rising from the intersection.

**Castletown harbour** was originally formed between a western pier 100 yards long in a S. by E.  $\frac{1}{4}$  E. direction, and an eastern tongue of ledges which are covered at high-water, the entrance between them being 100 feet wide. A swing-bridge divides the outer harbour from an

inner basin of 1 acre 3 roods, the width between the abutments of the bridge being 26 feet. The basin is quayed all round, and has a bottom of gravel.

In 1849, a new pier outside the old one, in the form of a segment of a circle, and 420 feet long, was completed, including between it and the old pier a space of one acre one rood, and the distance between the pier-heads being 222 feet.

**LIGHT.**—A lighthouse of grey stone stands near the head of the new pier, the light from it, *fixed* and *red*, and 32 feet above high-water, is shown all night, and is visible in the directions between the Stack and Langness for a distance of 8 miles.

**TIDES.**—It is high-water, full and change, at Castletown, at 11h. 10m.; springs rise 20 feet, neaps 16 feet. A strong current, beginning with the ebb upon the shore, sets across the bay in an easterly direction at the rate of  $2\frac{1}{2}$  knots, forming an eddy farther in.

The tide streams pass Langness at the rate of 5 knots at springs and  $2\frac{1}{2}$  knots at neaps, and, together with the eddy, run along the south-east side of the ness, 10 hours to the southward, viz., from 2 hours flood to the last of the ebb. Five miles off shore the flood and ebb set about East and West, at the rate of two knots.

**Pilots.**—Fishermen act as pilots, their charge varying from 5s. to 20s., according to tonnage.

Vessels drawing 12 feet can enter the outer harbour on springs, and those of 7 feet draught on neaps. There is a foot more depth within the old pier, and one foot less within the basin.

Closing the harbour from a position one cable to the eastward of the buoy, keep the lighthouse on the pier-head bearing about N.  $\frac{1}{2}$  W. while approaching it.

**Life-Boat.**—A life-boat is maintained, together with a rocket apparatus, belts, and lines.

**Supplies, Trade, &c.**—Small repairs can be made; and water may be filled from a pipe at the quay side. The exports are agricultural produce, and lime, and the imports coal, and general goods.

The population in 1881 was 2,243.

**LANGNESS**, the termination of the long peninsula which separates Castletown bay from Derby haven, is distinguished by a lighthouse, and also by a land-mark standing one-third of a mile from its outer end, which was built previous to the erection of the lighthouse to prevent Langness being mistaken for Scarlet point. The mark, a tower of stone 43 feet high,

with its base 65 feet above high-water, is in latitude  $54^{\circ} 3' 31''$  N., and longitude  $4^{\circ} 37' 15''$  W.

**LIGHT.**—A circular light-tower, built of dark grey stone, and 63 feet in height, stands on Langness; it exhibits, at 76 feet above high-water, a *flashing white* light, showing a flash *every five seconds*, that should be visible in clear weather from a distance of about 14 miles, except on those bearings where it is obscured by the coast.

**Fog Signal.**—In thick or foggy weather, a fog siren, which is placed on Langness, at 30 feet above the sea, is sounded at regular intervals, the periods of sound being of *five seconds* duration, and the periods of silence of *forty seconds* duration.

A singular chain of insulated rocks, 10 feet above high-water, under the general name of Langness point, extends out from the ness for 3 cables to the westward, having near its outer end the Skerranes, eight rocks which cover at half-flood. The bight between the Skerranes and southern angle of Langness is full of rocks, and unsafe. From Dreswick point to St. Michael or Fort island, Derby haven, the coast trends about N.E.  $\frac{1}{2}$  E. for  $1\frac{1}{2}$  mile, and consists of rugged abrupt rocks of schistose.

**Directions.**—In approaching from the westward, the lower disused light-house on the Calf just showing clear of the slope of Thick head, bearing N.W. by W.  $\frac{1}{2}$  W., will lead one mile outside Langness; and when Douglas head lighthouse opens out, bearing N.E., at an offing of 3 miles, the track towards it will lead about one mile and three-quarters outside St. Ann head. To guard against the tidal inset between Chicken rock and Langness, strangers should endeavour to maintain an offing of three or four miles.

In gales, a highly dangerous sea is often formed over some rough ground with 7 fathoms upon it, S.E. by S. three-quarters of a mile from St. Michael island; to avoid it, keep Clay head well open of Douglas head.

**DERBY BAY.**—Derby bay, contained between St. Michael island and St. Ann head, the latter bearing from the island E. by N.  $\frac{1}{2}$  N., is  $2\frac{1}{2}$  miles wide and about two-thirds of a mile deep. The shore from St. Michael island to Ronaldsway is flat, and from thence to Kirk Santon head, which is elevated 253 feet, are cliffs varying from 20 to 200 feet in height. The only portion used for anchorage is Derby haven, upon the west side of the bay and under the cover of St. Michael island; but this is open to the eastward, and in gales from north-east to south-east the sea sent home renders it a dangerous place to be caught in. The usual berth is in 3 or 4 fathoms, with the ruined fort on St. Michael island bearing S. by E.  $\frac{1}{2}$  E.; and the south-west end of the breakwater, W. by N.; and

rather nearer to the island than to the north side of the bay. The holding-ground is good, being sand over marl. In closing the anchorage it is necessary to give St. Michael island a berth of one cable, in order to avoid the ledges which project from it.

**Derby Haven.\***—Derby haven to the north-eastward of the peninsula of Langness, and  $6\frac{1}{2}$  miles W. by S.  $\frac{1}{2}$  S. from Douglas head, is immediately within St Michael, or, as it is generally called, Fort island, from the ruined fort near its north-eastern end, built by James, the seventh Earl of Derby. Upon the inner end of the island, which is connected to the shore by a causeway, are the scanty ruins of the ancient church of St. Michael, still occasionally used by Roman Catholics for the interment of their dead.

The haven is about half a mile across the mouth, and the same distance in depth, but fully half that extent is dry at low-water. A portion of this deep bight has been converted into a tide harbour, by the erection of a breakwater upon one of the ledges extending south-westerly from Ronalds-way kiln upon the north point, covering in the frontage of Derby haven village. This work, having a north-east and south-west direction, is 260 yards long and 26 feet wide at the top, and the ledge on which it stands dries 13 feet at low-water; it is furnished with mooring posts throughout, and with a landing-slip 100 feet from its north-east end. There is a passage by either end of the breakwater, and the shelter afforded is more or less complete over a space of about 4 acres.

**LIGHT.**—A *white* light is shown during the fishing season, or from 12th August to 10th October, from a lantern at the south-west end of the breakwater, at the height of 14 feet above high-water, and is visible at the distance of about 2 miles.

The south-western entrance (the one generally used) is between the end of the breakwater and a pole or perch upon the north-east end of a rocky ledge, the distance between them being about 60 yards. At high-water springs there is a depth of 14 to 15 feet in this passage. The bottom is a mixture of mud, sand, gravel, and marl; but for some distance within the breakwater the space is occupied by the ledge on which it is based, and is consequently unfit for berthage.

The north-east entrance, 60 yards wide, and with 9 feet in it at high-water springs, is seldom used.

The neck of land separating Derby haven from Castletown bay, and on which the village is situated, is not more than 150 yards across.

**COAST.**—Baltic rock, uncovering at half-ebb, lies South, half a cable from St. Ann head, and a little outside of it to the southward is a fang with

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\* See plan of Derby haven, on Admiralty chart No. 2094.

3 feet over it at low-water. From St. Ann head to Douglas head is E. by N.  $\frac{3}{4}$  N., 4 miles, and to Littleness,  $2\frac{1}{2}$  miles upon the same bearing, nearly the whole of this stretch of coast being composed of cliffs varying from 100 to 400 feet in height. Port Soderick, a small bight with a landing-place one mile to the westward of Littleness, has a white house a short distance within its beach, and some rocks, covered at high-water, extend out for two-thirds of a cable off the ness. From thence to Douglas head the cliffs are irregular in height and bold-to.

**DOUGLAS BAY**, 9 miles from Langness, and 10 miles from Maughold head, and, consequently, near the centre of the south-eastern side of the island, is contained between Douglas head and Banks point, which are  $2\frac{1}{2}$  miles apart; the depth of the bay being three-quarters of a mile, and the soundings along the line between the heads from 8 to 11 fathoms.\* The high-water shore consists of precipitous cliffs extending inwards from Douglas head, backed by the slopes of Nunnery hill, which is elevated 480 feet. The town of Douglas with its outskirts, extends for  $2\frac{1}{2}$  miles along the shore, and is succeeded by a bold coast line, Banks Howe sloping down from an elevation of 394 feet. The foreshore of gravel, sand, and rock, extends out from the harbour along the head of the bay to Port-e-Vada, for more than a quarter of a mile, rocky under-water shelves projecting for the same distance beyond.

The town of Douglas has an imposing panoramic effect in the approach from the offing, skirting along the rising ground for nearly the whole extent of the bay. Half a mile to the northward of the harbour an iron promenade pier extends 1,000 feet from the shore in a south-east direction; upon the head, which is dry at low tides, a *blue* light is exhibited, it is elevated 20 feet, and illuminates an arc of  $120^{\circ}$ . About midway, and just within the shore of the bay, is the extensive and handsome erection of castle Mona, formerly the residence of the duke of Atholl, but now converted into an hotel, from which to the north-eastward, the banks are studded with villas, terminating with Derby castle, on the margin of the sea. The chief portion of the town is along the north-east side of the harbour, and the towers and spires of its various churches are the most prominent of its public buildings.

**DOUGLAS HEAD.**—Douglas head is a bold feature when approached from any direction along shore; near its summit, 234 feet above the sea, is a large building which is used as an hotel.

**LIGHT.**—On Douglas head is a white lighthouse, of stone, and 65 feet high; from it is exhibited a *fixed white* light, 104 feet above high-

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\* See Admiralty chart of Douglas bay, No. 2696; scale,  $m = 12$  inches: also plan of Douglas harbour, on chart No. 2094; scale,  $m = 12$  inches.

water, and visible at the distance of 14 miles in clear weather. It is obscured inshore of the bearing N.E., and will, consequently, not be seen within 3 miles of Langness.

**Pollock Rock.**—From off the shore, 120 yards north-east of the inner or harbour pier, Pollock rock or ledge projects to the E.S.E.; it is uncovered at low-water for more than one cable, and has an average height of 17 feet. Along its southern side is the Victoria landing-pier, the direction of which is E.S.E. for 150 yards, and then about S.E. for 200 yards farther. A low-water landing-place, also, is at the north-east part of the rock, which is marked at its extremity by a small iron beacon carrying a skeleton globe.

**Conister, or St. Mary, Rock,** a detached mass eastward of the Pollock, and upon which numerous vessels have been wrecked, is, at low-water,  $1\frac{1}{2}$  cable in extent in an east and west direction, and a cable across. Upon the summit of the rock, which is covered at high-water, was built in 1833 a castellated beacon or refuge tower, to afford a safe retreat for shipwrecked crews. The Conister is foul outside, for one cable, the outer rock, bearing E.  $\frac{3}{4}$  S. from the tower, nearly dries to that distance at low-water springs.

The passage between Pollock and Conister rocks, about half a cable in width, is also nearly dry at equinoctial springs.

**Middle Ground,** a patch all but dry at low-water,  $3\frac{1}{2}$  cables below high-water mark, near the centre of the bay, lies with the Refuge tower bearing S.S.W.  $\frac{3}{4}$  W., and Castle Mona flagstaff N.  $\frac{1}{2}$  W.

**Anchorage.**—The bay is directly open to the south-eastward, and the holding-ground is indifferent, except about one cable eastward of Victoria pier, where the depth is 4 fathoms at low-water, over a bottom of clay coated by sand, the same character of bottom continuing to the mouth of the harbour, with gradually decreasing depths. The shelter in this position is good in all winds except those from the eastward and south-eastward. Vessels must, however, be careful not to obstruct the fairway of the approach to the pier.

**DOUGLAS HARBOUR** is formed by the outlet of Douglas river, which consists of two main branches, uniting about a mile from the town, the one rising on the west side of mount Gurraghan, called the Dhoo, and the other the Glass, from amidst the Greba range; the first with a very irregular course towards the south-west and south-south-east, and the latter for nearly the whole distance preserving a S.E. by S. direction for the harbour.

The harbour is covered in and defended by a north-eastern pier, constructed by Government at the latter end of last century, at an expense of

22,000*l.*: it is  $173\frac{1}{2}$  yards in length and  $13\frac{1}{2}$  yards broad for the first 150 yards, when it expands to the breadth of 30 yards, terminating in a circular and raised head, in the centre of which is the harbour lighthouse, the whole being built of yellow freestone.

The harbour is well quayed up to the bridge, a distance of nearly half a mile, and upon the south-west side of the entrance under Fort Anne hotel, is a transverse jetty extending in an E. by N.  $\frac{1}{4}$  N. direction for 90 yards for checking the in-run of the sea, leaving between the pier-heads an entrance of 73 yards. The space included within the harbour is equal to about 11 acres, nearly all dry at low-water, the bottom consisting principally of gravel over marl.

After heavy weather a small gravel bank or bar, 2 or 3 feet high, often forms from the inner pier-head; but this is as constantly removed, and, in general, vessels drawing 13 feet can enter in fine weather during springs, and those of 9 feet draught during neaps. The great drawback of the harbour is the heavy range thrown into it in south-easterly gales, and which is felt as far up as the bridge.

A breakwater, named Battery pier, formed of large blocks of concrete, extends from Little head E. by N.  $\frac{1}{2}$  N. for 193 yards, and then in a N.E.  $\frac{1}{4}$  E. direction for 60 yards; on its inner side, which has a depth of 11 feet at low-water, are mooring posts and bollards for the use of the mail packets which sometimes discharge their mails and passengers here when they cannot use Victoria pier.

The breakwater affords but little protection to the harbour during easterly winds.

**LIGHTS.**—At the outer end of the breakwater is a concrete light-tower, from which is exhibited a *fixed red* light, 40 feet above high-water, and visible from the distance of 6 miles.

A *fixed green* light, 25 feet high, and visible 3 miles off, between the bearings W.S.W. and N. by W. is at the head of Victoria pier, on the north side.

From a buff-coloured lighthouse with black roof, on the head of the harbour pier, a *fixed white* light is shown, 38 feet above high-water, while there is a depth of 9 feet on the bar at the pier-head. By day, a *red* ball indicates the same depth. The light is visible at the distance of 6 miles.

A *fixed blue* light is exhibited from the outer end of the iron promenade pier northward of the harbour; it is 20 feet above high-water, and should be visible in clear weather at the distance of 2 miles.

**TIDES.**—It is high-water, full and change, in Douglas bay, at 11h. 12m.; ordinary springs rise  $20\frac{3}{4}$  feet, and neaps 16 feet.



About half a mile outside of Douglas head the flood stream sets to the north-eastward, and the ebb to the south-westward, both at the rate of 2 knots per hour during springs.

The in-shore portion of the flood stream sets into Douglas bay towards Onchan bight at the rate of  $1\frac{1}{2}$  mile per hour. The ebb stream at Banks point begins one hour before high-water by the shore, when, proceeding towards the centre of the bay, it divides, one portion setting inside and the other outside of Conister rock, at the rate of about one knot. After clearing the rock they unite, sweep round Douglas head, and join the main stream half a mile outside of it. The stream from the inner portion of the bay, beginning at half-flood, sets outwardly past Douglas head for 9 hours out of the twelve.

**Pilots.**—There are no licensed pilots.

**Directions.**—Approaching from the south-westward towards the anchorage do not keep too close to the foot of Douglas head, as a rock lies out about 200 feet from the shore abreast the lighthouse; it is, however, necessary to borrow as closely to the head as practicable when it is blowing fresh from the westward, so as to fetch into the anchorage, and to avoid the risk of being driven to leeward of the Conister, by the strong and variable gusts from the high land: outside the Conister a vessel would be exposed, and in a bad anchorage. No special directions are necessary for entering the harbour, beyond keeping the pier-head in a westerly direction while approaching it, and when Conister rock covers there will generally be found a depth of 19 feet at the entrance, gradually diminishing inwards. In southerly gales, when it is not prudent to attempt Douglas, shelter may be obtained in Ramsey bay.

**Life-Boats.**—There are two life-boats stationed at Douglas, and also a rocket apparatus.

Douglas, although not the capital, is the largest and most important town in the island; it is distant from Castletown 10 miles, from Peel 11 miles, from the point of Ayre 26 miles, from Ramsey 16 miles, and from Laxey 8 miles. There is a railway from Douglas to Castletown and port Erin, and also to Peel and Ramsey. Direct steam communication is maintained with Liverpool, distant about 68 miles, daily throughout the year, and to Barrow daily during the summer; also to Dublin 80 miles, to Whitehaven 39 miles, to Sillioth 70 miles, and to Glasgow once a week.

**Supplies, Trade, &c.**—Douglas offers moderate facilities for repairs, and has an iron foundry. Ample supplies of coal are always in store, and other requisites for shipping can be readily procured; water is led down by pipes to the pier-heads. The numerous visitors, conveyed by the various steamers to the island during the summer, is one of the most striking characteristics of the place.

There is telegraphic communication, by means of the submarine cable between Ramsey bay and St. Bees, with all parts of Great Britain.

There is a marine barometer near the harbour office, for the benefit of seamen and fishermen. Danish and Swedish consuls are resident.

The population in 1881 was 15,719; in 1851 9,880.

**LaxeY Bay.**—Clay head, the south-west point of LaxeY bay, is N.E. by E.  $\frac{1}{2}$  E.,  $4\frac{1}{4}$  miles from Douglas head, and the intervening coast consists of rounded summits nearly 400 feet in height, with rocky bases bold close to.

LaxeY bay is contained between Clay and LaxeY heads, which bear N.E.  $\frac{3}{4}$  N. and S.W.  $\frac{3}{4}$  S., distant  $2\frac{1}{4}$  miles from each other. Along the bounding line the depth is 7 to 10 fathoms, and the bay is three-quarters of a mile deep. The slopes skirting LaxeY bay are all well cultivated. Kirk Lonan, with a pinnacled tower, is prominent upon the outline, and the village of LaxeY, with a steep beach fronting it, is clustered about the slopes and the mouth of the vale of LaxeY river. This river descends from the eastern declivity of Snaefell, which bears N.N.W.  $3\frac{1}{2}$  miles from the bridge. Coasters often take the beach in front of the village to load with the lead ore obtained from the mines in the neighbourhood. A water wheel,  $72\frac{1}{2}$  feet in diameter and said to be the largest in the world, is at a mine a short way up the valley.

**Anchorage.**—The best anchorage, and where vessels may wait a tide in moderate off-shore winds, is on the south-western side of the bay, in a depth of 5 to 7 fathoms, over fine sand.

From Clay head to Maughold head the course is N.E.  $\frac{1}{2}$  E.,  $6\frac{3}{4}$  miles; to the eastward of LaxeY head is Carrick Roayrt, a small rock one cable from the shore, covering at three-quarters flood, and with deep water close to it. Half-way between the heads is the mouth of Kenny river, which is fronted by a steep beach; port Cornah, the creek within it, can be entered by boats after half-flood. Cultivation extends over the vale of the Kenny, as well as over a portion of the neighbouring hills. The coast between the heads consists of cliffs ranging from 100 to 200 feet in height, and is similar to that to the south-westward of LaxeY bay.

**MAUGHOLD HEAD,** a cliff 373 feet high and the most eastern point of the island, is rendered more conspicuous from having a hill summit just within it; it is bold close to, with the exception of the Carrick, a small rock near its base, which covers at three-quarters flood. A little within the head is the ancient parish church, and surrounding houses of Maughold, and on the cliff side, a well famed for its supposed medicinal properties.

A short distance north-west of the head is port Blais, with a beach at the head of it and comparatively low land about it, but the interior is level and mostly occupied by bad ground.

From Maughold head to the point of Rye, the northern boundary of Ramsey bay, is N.  $\frac{1}{2}$  E.  $\frac{1}{2}$  miles.

**RAMSEY BAY.\***—This bay is about two miles long, and narrows with great regularity. The depths across the bay vary from 4 to 7 fathoms at low-water, increasing gradually towards the shore. Half-way from the head towards Ramsey is Taldoland point, north of which one-quarter of a mile is Carrick rock, and within the light beamed by the point is a wooden jetty for the disposal of ore, but the entrance is shallow and rocky. To as far as the town of Ramsey, at the head of the bay, the shore, with the exception of Carrick rock, is bold close in and backed by high and moderately wooded hills, upon one of which, north of the town, and elevated 360 feet, the tower built to commemorate the visit of the late Prince Consort is very prominent. Three miles north-eastward is Cranial point and Clay beach, with an elevation near the shore of 267 feet, called Breaker-day hill.

On both sides of the head or cliffs, viz., towards Ramsey and the point of Rye, the coast is low, skirted by a shingle and sandy beach, with some bad ground off the cliffs. On a rise a little north of the town is a conspicuous windmill. North Barrule is S.W.  $\frac{1}{2}$  S., 2 miles from Ramsey, and northward of Bulley river the land becomes low and highly cultivated, especially around Kirk Andrews.

**Telegraph Cable.**—From Port-o-Mwyllin, on the east side of Taldoland point, a telegraphic cable was, in 1863, laid to St. Bees head; it passes about three-quarters of a mile south of Bahama bank light-vessel and covers a distance of 28 $\frac{1}{2}$  miles.

**Pier and Lights.**—A landing and promenade pier, of iron, is now (1888) being constructed about 600 yards southward of the entrance of Ramsey harbour; it extends from the shore in an easterly direction, is to be 720 yards in length, and is to terminate in a depth of 12 feet at low-water of ordinary springs. The extremity of the pier is marked by two fixed red lights, placed vertically, and similar lights will be exhibited when the pier is completed.

**Anchorage.**—The best anchorage in Ramsey bay is with Maughold head bearing S.  $\frac{1}{4}$  E., and Ramsey harbour pier W.  $\frac{3}{4}$  N., distant 1 $\frac{1}{2}$  mile: here the bottom is mud, and the depth 6 fathoms. The heaviest sea in

\* See plan of Ramsey bay, on Admiralty chart No. 2,094.

the bay is with winds from E.N.E. to S.S.E., between which points it is open.

**TIDES.**—It is high-water, full and change, in Ramsey bay, at 11b. 12m.; springs rise  $20\frac{3}{4}$  feet, neaps 16 feet.

The stream in the bay runs 9 hours to the northward, and 3 hours to the southward, the latter beginning at 2 hours flood; but off Maughold head the stream sets 9 hours to the southward, turning to the north-eastward one hour before low-water and so continuing until 2 hours flood.

**Ramsey Harbour.**—This harbour is formed by the outlet of the Sulby, which is the largest river in the island, and rises in the mountain group of Snue Fell; it is defended at the entrance by two parallel piers extending in a general E.S.E. direction for about 424 yards. The direction in through the entrance (50 yards wide) is W.N.W., but the piers are fronted by banks of shingle and sand, which dry at low-water. At the heel of the south pier the harbour turns sharply to the southward and then makes a complete horse-shoe bend along the quays which skirt the town. The soil is gravel over clay. Freshes are sometimes heavy, and the tide flows about two miles up the river.

Vessels drawing 16 feet may reach the quay on average springs, and those of 9 feet draught on neaps. Pilots are to be obtained in moderate weather, but if unable to procure one, steer directly in between the piers. In doing so, however, be guarded against the set across the entrance, during north-east and south-east winds, and keep nearer the weather pier-head. The channel between the piers is for some distance along the north side, and then curves round towards the heel of the south pier. In case of extremity, beach as near the harbour entrance as possible, or, should there be sufficient depth of water, a vessel may run into the harbour and ground on a shelly bank at the inner end of the piers with safety.

**LIGHTS.**—From a lighthouse at the head of the north pier of Ramsey harbour, a *fixed green* light is shown 34 feet above high-water, visible at the distance of 9 miles: and from a lighthouse on the south pier-head is exhibited a *fixed red* light, 28 feet above high-water, and visible 4 miles off.

**Life-Boat.**—A life-boat is stationed at Ramsey, and a rocket apparatus is kept in readiness to assist stranded vessels.

Ramsey has a patent slip, adapted to take up vessels of 300 or 400 tons, and shipbuilding in wood and iron is carried on. Supplies are moderate, and water is led down in pipes to the quay. The exports consist of agricultural produce, and the imports of general goods. Communication with Liverpool and Whitehaven is maintained once a week by steamer, the distances being 76 and 30 miles.

The population in 1861 was 4,821.

**POINT of AYRE**, or Ayre point, the north-western extremity of the Isle of Man, is the termination of an extensive plain, and a low, sandy and stony beach extends from it all the way to Ramsey, and also nearly to Peel, on the opposite side of the island.

**LIGHT**.—A lighthouse of stone, coloured white, and 36 feet high, stands on a promontory of a mile within the high-water boundary of Ayre point. The light from it, 106 feet above high-water, renders every vessel, and is alternately white and red; it is visible at the distance of 1½ miles in clear weather from between the bearings N.  $\frac{1}{4}$  E., through west and south, to E.  $\frac{1}{4}$  S., within which bearings the light is obscured by the land. The lighthouse is in latitude 54° 24' 56" N. and longitude 4° 22' 1" W., and from it are the following bearings and distances, viz. :—

Bea point	-	-	-	W. $\frac{1}{2}$ N.	-	3½ miles.
St. John's point lighthouse, Dundrum bay	-	-	-	W. $\frac{1}{2}$ N.	-	67
South rock	-	-	-	W. by N. $\frac{1}{4}$ N.	-	37
Copeland lighthouse	-	-	-	N.W. $\frac{1}{4}$ W.	-	44
Mall of Galloway	-	-	-	N.N.W. $\frac{1}{4}$ W.	-	23½
Burrow head	-	-	-	N. by E. $\frac{1}{4}$ E.	-	15½
Little Ross lighthouse	-	-	-	N.E. $\frac{1}{4}$ E.	-	20½
N.W. lightship, Mersey	-	-	-	S. $\frac{1}{2}$ E.	-	62½
Maughold head	-	-	-	S. $\frac{1}{4}$ W.	-	7½

#### OFFING SHOALS.

Several shoals lie off the shore and in the offing fronting Ramsey bay, the nearest of which—

**WHITESTONE BANK**, near the point of Ayre, is generally composed of white stones and gravel. Its south extreme of 5 fathoms is one mile inshore of the north end of Bahama bank, from whence, running N. by W. for 2½ miles to Ayre Hook, it doubles sharply to the westward and joins the shore at the pitch of the point. Its general breadth is about half a mile. Patches of 3½ fathoms are pretty generally distributed over the bank, but at a spot S.E.  $\frac{1}{4}$  E. 1½ mile from Ayre lighthouse, the depth at low-water is only 8 feet, with the summit of North Barrule showing in line over Ramsey south pier lighthouse.

The passage between the point and the shoal of 4½ and 5 fathoms is only one-third of a mile wide.

Ramsey old windmill, just open of the clay cliffs, bearing S.W.  $\frac{1}{2}$  S., leads over the hook westward of the bank, in 4 fathoms.

**BALLACASH BANK**, has its central and shoalest patches, 7 to 11 feet, E.  $\frac{3}{4}$  S. 5 miles from the point of Ayre lighthouse. The bank lies about north-west and south-east, is, within the 5 fathoms limit, 2 miles long, and half a mile broad; its south-eastern end bears N.N.E.  $\frac{1}{2}$  E. 6 miles from Bahama bank light-vessel, and W. by N.  $\frac{3}{4}$  N. about 6 miles from the buoy upon King William banks.

The passage between Ballacash and Bahama banks is  $2\frac{1}{2}$  miles wide, with depths of 10 to 26 fathoms.

**KING WILLIAM BANKS**, two in number, and the outermost shoals, run irregularly in a N.W. by W. and S.E. by E. direction for  $5\frac{1}{2}$  miles, with an average breadth of about half a mile; their north-west end, in 5 fathoms, is E.  $\frac{1}{2}$  S., nearly 7 miles from the point of Ayre lighthouse, and their south-east end is E. by N.  $\frac{1}{2}$  N., 13 miles from Maughold head. There are several spots of 2 and  $2\frac{1}{2}$  fathoms upon the north-western and main bank; the south-eastern bank, which is separated by a passage half a mile wide, has from  $4\frac{1}{2}$  to 5 fathoms over it.

**Buoy**.—A conical buoy, *striped red and white horizontally*, with staff and diamond, lies in 6 fathoms at the south-eastern end of the shoals, E. by N.  $\frac{1}{2}$  N., 13 miles from Maughold head; E. by N.  $\frac{3}{4}$  N.,  $9\frac{1}{8}$  miles from Bahama bank light-vessel; E. by S.  $\frac{1}{2}$  S., 12 miles from the point of Ayre lighthouse; and  $14\frac{1}{2}$  miles W.  $\frac{1}{8}$  N. from St. Bees lighthouse.

Snae Fell kept to the southward of North Barrule, bearing W. by S., will clear the south-eastern end of the banks in 5 or 6 fathoms at low-water.

The passage between Ballacash and King William banks is  $1\frac{1}{2}$  mile wide, with from 14 to 19 fathoms depth in mid-channel; and between the latter and St. Bees there is 23 fathoms, decreasing gradually to 10 fathoms towards the head.

**BAHAMA BANK**.—Bahama bank, extending in a N.N.W. and S.S.E. direction, is 5 miles long from 5 fathoms upon each end, and three-quarters of a mile broad. Its southern extremity is E. by N.  $\frac{1}{2}$  N.  $4\frac{1}{4}$  miles from Maughold head, and the northern extremity is S.E. by E.  $2\frac{1}{2}$  miles from the point of Ayre lighthouse, while the shoalest spot (5 feet) is E.  $\frac{3}{4}$  N.  $5\frac{1}{2}$  miles from Ramsey lighthouse.

**LIGHT-VESSEL**.—A light-vessel, painted red, with "Bahama Bank" on her sides, and carrying one mast with a globe, is moored in 11 fathoms,  $1\frac{1}{4}$  mile to the south-westward of the south-east tail of the bank, E.  $\frac{3}{4}$  N.  $3\frac{1}{8}$  miles from Maughold head, and S.S.E.  $7\frac{1}{2}$  miles from the point of Ayre lighthouse. She exhibits one *flashing white* light showing *two flashes* in quick succession *every half-minute*, at 38 feet above the water, and visible at the distance of 10 miles in clear weather.



**Fog Signal.**—During thick or foggy weather, a fog alarm given from *Abnair* is quick succession every two minutes.\*

From the coast, the buoy upon King William bank is E. by N.  $\frac{1}{2}$  N.,  $\frac{1}{2}$  miles.

**Buoy.**—A red wax which buoy lies in 8 fathoms half-way between the coast and Balauna bank.

Should the light-vessel bank admit, the southern end of Balauna bank will be cleared  $\frac{1}{2}$  mile, in 7 fathoms, by keeping Douglas head open of Clay head, bearing N.W. by W.  $\frac{1}{2}$  W.

**STRUNAKILL BANK** has its centre, upon which there is a depth of  $4\frac{1}{2}$  fathoms, N.W.  $\frac{1}{2}$  N., one mile from the point of Ayre, and from its Rue point bears W. by S.  $\frac{1}{2}$  S., distant  $2\frac{1}{2}$  miles. The bank, within a 5-fathoms boundary, is half a mile long in a N.W. and S.E. direction, and one-quarter of a mile broad. The tidal streams set directly across this bank, and when they are opposed by strong winds a heavy barrelling sea is formed over it and Whitestone bank. To avoid it, at such times, it is best to pass through the channel between the shoal and the shore, which is 10 fathoms deep and half a mile wide.

**TIDES.**—It is high-water, full and change, at the point of Ayre, at 11h. 7m.; springs rise about 20 feet, and neaps 16 feet. In the channel between the point, and Burrow head on the coast of Scotland, at a 10 miles offing, the flood and ebb streams run E. by S. and W. by N.; the rate of the former being  $2\frac{1}{2}$  knots, and of the latter  $3\frac{1}{2}$  knots per hour. Across Balauna bank the streams set about E. by S. and W. by N.,  $2\frac{1}{2}$  and  $1\frac{1}{2}$  knots.

Two miles off Ayre point, the depths across to Burrow head are from 25 to 30 fathoms, and towards the Mull of Galloway the soundings are very irregular, from 20 to 30 fathoms, with 19 fathoms in the centre, over sand and shells.

**COAST.**—From the point of Ayre, low land extends W.  $\frac{1}{2}$  N.  $3\frac{1}{4}$  miles to Rue point, off which a spit of sand, with 2 to 6 feet over it at low-water, projects out for 4 cables;  $1\frac{1}{2}$  mile westward of the Rue is the outlet of the river Leavens, Blue point lying between. Steep braes from 100 to 150 feet high succeed to Jurby point, having near it Jurby church, which, from being situated on land higher than any about it, shows well from every direction. From Jurby point to Peel Castle island is S.W. by W.  $9\frac{1}{4}$  miles, the coast curving gradually inwards, and forming a bay between the points of about a mile deep; the soundings along the line are from 4 to 6 fathoms. The whole shore to Creg Malin on the east side of Peel bay consists of clay cliffs, varying from 60 to 160 feet in height, backed by the bold slopes

\* See regulations respecting light-vessels, &c., page 80.

of the adjoining mountains. Ravensdale stream has its outlet  $1\frac{3}{4}$  mile from Jurby point near to which is the old church of Ballaugh.

**Orrisdale Head** is 2 miles beyond, with a peak over it elevated 140 feet: half a mile within, is Bishop's Court, for many centuries the palace of the bishops. Kirk Michael church, with its transept and pinnacled tower, half-way between Jurby and Pèel, and with a glen on either side, is a fine object viewed from the sea: and  $2\frac{1}{2}$  miles beyond is Ballaboo point, which is  $2\frac{3}{4}$  miles from Peel. The bay contains the following dangers, viz:—

**Jurby Rock**, with 9 feet upon it at low-water, is about two-thirds of a mile to the westward of Jurby point, and 4 cables from high-water mark. It lies with the following bearings:—North Barrule, S.E.  $\frac{3}{4}$  S.; Ballaugh old church, S.  $\frac{3}{4}$  W.; and Orrisdale head, S.W.  $\frac{3}{4}$  S., distant  $3\frac{1}{4}$  miles.

**Craig Rock**,  $1\frac{1}{2}$  mile north-west of Ballaboo point, and N.E.  $\frac{1}{4}$  E.  $2\frac{1}{2}$  miles from Peel castle, has only 13 feet over it at low-water, and 5 and 6 fathoms within it. To clear it to the northward, keep Kirk Michael church, in line with the west point of the sand-cliffs of Glen Wyllin, E.  $\frac{1}{4}$  S.; and to pass to the westward, keep the western portion of the Calf of Man open of Contrary head, bearing S.W.

**PEEL** is situated upon the right bank of the outlet of the river Neb\*, which rises on the north-east side of South Barrule, and flowing northward, unites, not far from the Tinwald hill, with another stream from the north-east. During the feudal times Peel derived some consequence from its castle, and when the smuggling trade was at its height was a town of importance. Since that period, however, the inhabitants have been chiefly employed in agriculture and fishing, the adjoining sea abounding in cod, haddock, and herring.

**Peel Castle** occupies a prominent place among the antiquities of the island, and the ruins of it are extensive. It is situated on a rocky islet one hundred yards north-west of the town, and is separated from it by the Neb. The islet is connected to the main shore by means of a causeway; a bridge also of more recent construction spans the river. The walls of the castle, three to four feet thick, and flanked by towers, are supposed to have been built in 1500 by the Earl of Derby. They enclose an area of about 5 acres, which is almost covered by the ruins of various buildings which have fallen into decay since the island became vested in the Crown. Within the area are the ruins of two churches; one of them, supposed to have been the first christian church erected in the Isle of Man, was dedicated to St. Patrick; the other, the cathedral church of Man, dedicated to St. German, was rebuilt about 1245, and the interior is still occasionally used as a burying place.

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\* See plan of Peel, on Admiralty chart No. 2,094.



**Harbour.**—Peel harbour, formed by the outlet of the river Noh, is defended seaward by a pier extending in a N.N.E.  $\frac{1}{2}$  E. direction for upwards of 100 yards; this pier is continued inwards for 300 yards by a quay. The inlet into the harbour is partially checked by a breakwater projecting in an easterly direction from the north-east end of Peel island, and further in on the same side by a jetty.

The harbour has an area of 4 or 5 acres. The bottom upon the western side is very bad ground, and the bottom on the eastern side is good sand. Vessels draw 12 ft. 15 ft. or 18 ft. and are situated on ground, and those of 5 and 10 ft. draw are moored to the jetty end and are the red light on the port end.

The great drawback of the harbour is the heavy storm sent into it in winter and westerly gales, rendering it difficult to secure vessels of burden in to prevent damage.

**LIGHTS.**—A fixed red light, 21 feet above high-water, and visible at the distance of 2 miles, is exhibited from a wooden lighthouse at the end of the pier on the east side of Peel harbour. And a fixed white light, 32 feet high, visible 5 miles off, is shown from the extremity of the northern breakwater on the west side. From the red light, the Mull of Galloway light bears N. by E., distant 25 miles, and is of much service to those frequenting the port. Vessels coming from the southward and opening this light must be careful not to overshoot the port and be thrown to leeward with a southerly wind.

**Anchorage.**—The best anchorage while waiting tide to enter the harbour is in  $3\frac{1}{2}$  or 4 fathoms at low-water, over sand, with the lighthouse on the pier-head bearing S.W. by W.  $\frac{1}{2}$  W. In case of extremity, run on the smooth beach at the eastern end of the town, for the crews of vessels there are generally saved.

**TIDES.**—It is high-water, full and change, at Peel, at 11h. 8m.; equinoctial springs rise  $20\frac{1}{2}$  feet, ordinary springs  $18\frac{1}{2}$  feet, and neaps 14½ feet.

Off Jurby point the flood stream sets towards the point of Ayre at the rate of one knot per hour during springs, gradually increasing in velocity as it approaches the lighthouse: it slacks and turns one hour before high water. The ebb sets along the shore to the westward, turning one hour before low water; its rate, one knot at first, gradually decreasing as it approaches Peel, abreast which place there is no perceptible stream. Two miles north of Peel, and beyond, the streams set to and from the point of Ayre; and from 5 to 10 miles W.N.W. from Peel, they set to and from the Gulf of Man at the rate of  $1\frac{1}{2}$  knot per hour, having even less than that velocity further to the westward.

**Rockets.**—A rocket apparatus is kept at the coast-guard station.

**Supplies, Trade, &c.**—There are facilities for the repair of coasting vessels, and moderate supplies, including water, are readily obtained. Agricultural produce and fish are exported; and coal, timber, iron, and general goods, are imported. Peel is a creek of Douglas custom-house.

The population in 1881 was 4,360.

**COAST.**—From Castle point to Contrary head is S.W. by W.  $\frac{1}{4}$  W.  $1\frac{1}{4}$  mile, the coast consisting of hills varying from 200 to 469 feet in height and sloping down to rocky bases. Upon a summit a little to the eastward of the head is Corrin's Folly, a square stone building 37 feet high. The Thistle, a small rock, lies close inshore, off Thistle head, nearly midway between the castle and Contrary head. The latter headland receives its name from the streams of flood round the south and north coasts of Ireland, meeting a short distance in the offing abreast it.

To keep in the main stream of flood off Contrary head, Chicken rock should be open of the Stack of the Calf of Man, bearing S.W. by S.

**Niarbyl Point** is  $3\frac{1}{2}$  miles S.W.  $\frac{1}{3}$  S. from Contrary head, the coast forming an indenture half a mile deep, with the deep vale and waterfall of Glen Meay or Glenmoif about midway. The shore consists of precipitous cliffs ranging from 100 to 200 feet in height, and gradually declining towards Niarbyl point, which is low and rocky, the ledge from it extending W.  $\frac{1}{4}$  S. for one-quarter of a mile nearly; with this exception, this section of the shore is clear at a short distance off. Two and three-quarters miles south-east of Niarbyl point is South Barrule, elevated 1,584 feet; and half a mile within the shore of the bay to the southward is Cronkny-Arrey Lhaa, rising to 1,450 feet. South of these hills the land becomes low.

From Niarbyl point to Bradda head the direction is S.W.  $\frac{1}{3}$  S. and the distance  $4\frac{1}{4}$  miles, the intervening bight being three-quarters of a mile deep, with 7 to 13 fathoms in it. The small cove of Fleshwick bay, upon its south-western side, is open to the northward, but affords shelter to the fishing boats in off-shore winds. The coast is of the same character as that north-east of it, but the cliffs are of greater height, that of Bradda head being 382 feet above high-water, and the rise over it 758 feet. From Bradda or Breda head to the stack of the Calf of Man is S.W. by W.  $\frac{1}{3}$  W., 3 miles.

There is but little stream along the shore from Peel to Bradda head.

**PORT ERIN**,  $1\frac{1}{4}$  mile from the south-western extremity of the Isle of Man,\* is formed between the south side of Bradda head and the Skerranes (rocks covering at high-water half a cable from it), and

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\* See plan of port Erin, on Admiralty chart No. 2,094.

two projecting rocks to the southward named the Castles. The port, about 4 cables wide and deep, extends in an easterly direction, and shelves gradually from 7 fathoms at the entrance, to the fine sandy beach which skirts its head.

**Breakwater.\***—From off the shore, a little eastward of Castle islet, a breakwater extends with a curve from north-west towards north-north-east for a distance of 197 yards, enclosing depths of from  $5\frac{1}{2}$  to  $2\frac{1}{2}$  fathoms a quarter of a mile within. A landing-pier projects from the butt of the breakwater in an east direction for 100 yards, and has 11 to 13 feet depth alongside it at low-water.

Port Erin is directly open to the westward, but receives much protection from the breakwater, and in all winds from north, east about, to S.W. by S., excellent shelter may be obtained in it, in 3 to 5 fathoms, over a bottom of sand-coated clay. The village, prettily situated along the shore of the bay, is inhabited by fishermen, and frequented in the season for bathing.

**LIGHT.**—Upon the extreme end of the breakwater at Port Erin is exhibited a *fixed green* light, elevated 25 feet, and visible at the distance of 3 miles.\*

**TIDES.**—It is high-water, full and change, at port Erin, at 10h. 57m.; springs rise  $16\frac{1}{2}$  feet, neaps  $10\frac{1}{2}$  feet.

From the Castles, on the south side of port Erin, the remainder of the coast of Man to its south-western termination near Kitterland island trends W.S.W. to Half-way rock, and then more southerly, for  $1\frac{3}{4}$  mile, consisting of cliffs from 100 to 300 feet in height. It is foul to the distance of 2 cables off, and several rocks projecting out from the base of the cliff cover between half-flood and high-water.

**Tidal Streams.**—Close off Bradda head the stream changes a little before that in Calf sound, viz., two hours before high-water, when it takes a north-westerly direction, till it becomes merged in the main stream. Between Niarbyl point and the head an eddy is formed.

**Soundings.**—The 20-fathoms line runs from about one mile off Chicken rock, near the Calf, to four miles abreast Contrary head and Jurby point; but banks of sand and shells extend out from the latter half-way to the Mull of Galloway, having from 16 to 20 fathoms over them. From 40 to 50 fathoms will be found seven to ten miles off Contrary head, and above 30 fathoms, eight miles to the south-west of the Calf, over mud, sand, and shells.

\* CAUTION.—The outer portion of the breakwater at Port Erin has for a length of several hundred feet been partially demolished by the sea, and is covered at high-water of ordinary spring tides; vessels entering the harbour are therefore cautioned to keep well towards the north side of the bay to avoid the submerged portion.

The exhibition of the light will be discontinued until further notice. Notice to Mariners, No. 39 of 1884.

## APPENDIX.

The following general tide table for Liverpool bay will enable vessels at all times to determine with tolerable accuracy the depths to be expected in the various channels.

TABLE I.  
GENERAL TIDE TABLE FOR LIVERPOOL BAY.

When High Water takes place at or near the hours of	Showing the Height of the Tide above the Low Water Level of Springs at the periods indicated.											
	FLOOD TIDE.—Hours before High Water					High Water.	EBB TIDE.—Hours after High Water.					
	5	4	3	2	1		1	2	3	4	5	6
	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.		ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.
XII.	2 0	6 5	13 0	19 7	24 0	26 0	23 6	18 1	12 10	8 1	4 5	1 8
I.	1 4	5 9	12 10	19 10	24 7	26 9	23 11	18 3	12 8	7 10	3 11	1 3
II.	1 4	5 6	12 8	19 8	24 0	26 6	23 10	18 3	12 8	7 10	3 11	1 3
III.	1 10	6 0	12 7	19 2	23 5	25 5	23 1	18 0	12 9	8 3	4 5	1 9
IV.	2 8	6 8	12 6	18 5	22 3	24 2	22 1	17 8	12 10	8 7	5 0	2 7
V.	3 11	7 4	12 6	17 6	20 10	22 7	20 9	17 0	12 11	5 11	5 7	3 5
VI.	5 9	8 5	12 6	16 9	19 5	20 9	19 5	16 3	13 0	9 7	6 7	4 7
VII.	6 10	9 1	12 7	16 4	18 11	20 1	18 10	15 11	13 0	10 1	7 8	5 10
VIII.	6 9	9 1	12 8	16 6	19 1	20 3	18 11	16 0	12 11	10 2	8 0	6 0
IX.	5 7	8 5	12 8	17 1	20 0	21 7	19 10	16 5	12 11	9 7	6 10	4 7
X.	4 3	7 9	12 10	18 2	21 7	23 6	21 5	17 2	12 11	9 0	5 8	3 2
XI.	3 0	7 2	13 0	19 0	23 0	24 10	22 8	17 10	13 0	8 7	5 0	2 4

The preceding Table serves for all parts of the chart of Liverpool bay by adding to the soundings expressed therein the feet and inches found in the table. The skilful mariner, however, knows that as the moon's declination, as well as her distance from the earth, are continually changing, so must the *mean* rise of the tide, which alone can be given in a general table, always differ from the *real* rise; and the tabular heights must therefore be considered as only approximations to within one or two feet of the truth.

To use this Table, the time of high water on the day in question at Liverpool, must either be computed or taken from the Admiralty tide tables, or from one of the Liverpool almanacks. Look in the left hand column of the table for this time, or rather for the nearest hour to it. Carry the eye along the line on which that hour stands, till it comes to the column headed by the given number of hours *before* or *after* high water; and the feet and inches there marked will be the required height, which is to be added to the low water soundings expressed in the chart.

*Example.*—Suppose it to be high water at Liverpool at 3 o'clock, what would be the depth on the Rock Bar at 1 o'clock or two hours before high water?

In the first column look for III., carry the eye along that line till it meets the column headed "2 hours before H.W.," and there 19 feet 2 inches

will be found. Now the least water marked on the bar, in the chart, is  $\frac{1}{3}$ rd

	Feet.	Inches.
of a fathom, or - - - - -	2	0
Add thereto - - - - -	19	2
The sum - - - - -	21	2

is the required depth on the bar at 1 o'clock.

Again, suppose that on the same day the depth on the bar of Queen Channel at 11 o'clock, or four hours before high water, be required.

On the line with III., and under the heading "4 hours before H.W.," we find 6 feet; and the least water marked on the bar, in the chart,

	Feet.	Inches.
being $1\frac{1}{3}$ fathoms, or - - - - -	8	0
Add thereto - - - - -	6	0
The result is - - - - -	14	0

If the time at which the vessel arrives at the bar should be a broken hour, suppose 20 minutes after 11 o'clock, there will be no difficulty in finding the proportional part due to those 20 minutes.

	Feet.	Inches.
<i>Example.</i> —At 4 hours before H.W. we find as above	6	0
And at 3 hours before H.W. - - - - -	12	7
Difference - - - - -	6	7

As 20 minutes is the third part of an hour, so the  
third part of 6 feet 7 inches is nearly - - - 2 2  
Which added to the height at 11 o'clock - - - 6 0

Gives for the rise at 11 hours 20 minutes - - - 8 2  
Add the soundings on the chart as above - - - 8 0

The result gives the depth on the bar at 11 hours 20  
minutes - - - - - 16 2

The tide establishment, or, in other words, the time of high water on the days of the full and change of the moon is,—

	h.	m.
Abreast of Formby - - - - -	10	35
At the mouth of the Dee - - - - -	10	54
At Canning Dock - - - - -	11	23

and the range of the tide, or its mean rise from low water to high water is,—

	At Formby.	At the Mouth of the Dee.	At Canning Dock.
	Feet.	Feet.	Feet.
On neaps - - - - -	19	19	$20\frac{1}{4}$
„ ordinary springs - - - - -	24	25	$27\frac{1}{2}$
„ equinoxial springs - - - - -	32	32	33

TABLE II.—SHOWING AVERAGE RISE AND FALL OF TIDE IN THE RIVER MERSEY AND LIVERPOOL BAY ABOVE THE LEVEL OF LOW WATER OF A TIDE 10 FEET BELOW OLD DOCK SILL, ADAPTED FOR REFERENCE TO LIVERPOOL AND ADMIRALTY TIDE TABLES.

Heights of High Water above the Old Dock Sill by Liverpool Tide Table.	Feet. 10	FLOOD TIDE.—Average Rise of Tide in feet and inches at George's Pier at every half hour before High Water by Liverpool Tide Table, and simultaneous height in the Bay.															EBB TIDE.—Average Fall of Tide in feet and inches at George's Pier at every half hour after High Water by Liverpool Tide Table, and simultaneous height in the Bay.															Heights of High Water above the Old Dock Sill by Liverpool Tide Table.
		Time	6	5½	5	4½	4	3½	3	2½	2	1½	1	½	0	½	1	1½	2	2½	3	3½	4	4½	5	5½	6	6½	7			
11	George's Pier	8	68	68	11	9	9	10	11	12	5	14	3	15	9	17	3	18	5	19	4	19	11	20	19	11	19	4	19	11		
	Liverpool Bay	8	5	8	7	9	2	10	2	11	5	14	4	15	10	17	3	18	5	19	4	19	11	20	19	11	19	4	19	11		
12	George's Pier	7	107	11	8	7	9	5	10	9	12	4	16	2	17	11	9	3	20	4	20	10	20	11	21	0	20	10	20	11		
	Liverpool Bay	8	0	3	8	10	2	11	4	13	1	14	8	16	3	20	5	20	4	20	10	20	11	21	0	20	10	20	11	21		
13	George's Pier	7	37	47	11	9	0	10	6	12	4	14	7	16	8	6	20	0	21	9	21	0	21	9	21	0	21	9	21	0		
	Liverpool Bay	7	37	47	11	9	0	10	6	12	4	14	7	16	8	6	20	0	21	9	21	0	21	9	21	0	21	9	21	0		
14	George's Pier	6	46	67	2	8	5	10	2	12	3	14	9	17	1	19	2	20	9	22	9	22	9	22	9	22	9	22	9	22		
	Liverpool Bay	6	36	57	10	9	5	10	1	13	1	15	4	17	5	19	2	20	9	22	9	22	9	22	9	22	9	22	9	22		
15	George's Pier	5	35	35	8	7	4	9	6	12	2	15	0	17	11	20	4	22	3	23	8	24	8	25	0	24	8	25	0	24		
	Liverpool Bay	5	25	48	7	8	5	10	6	13	1	15	1	18	7	21	0	22	9	23	8	24	8	25	0	24	8	25	0	24		
16	George's Pier	3	10	4	9	6	8	9	0	12	0	15	2	19	1	23	2	24	7	25	5	26	7	28	0	25	5	26	7	28		
	Liverpool Bay	3	11	5	4	7	10	10	3	13	0	16	2	20	1	24	2	25	6	26	7	28	0	25	5	26	7	28	0	25		
17	George's Pier	3	14	0	5	10	8	6	11	11	5	4	9	12	7	23	10	23	2	24	7	25	5	26	7	28	0	25	5	26		
	Liverpool Bay	3	14	0	5	10	8	6	11	11	5	4	9	12	7	23	10	23	2	24	7	25	5	26	7	28	0	25	5	26		
18	George's Pier	2	43	2	5	1	8	0	11	8	15	5	19	3	22	1	24	6	26	2	27	6	28	0	26	0	27	6	28	0		
	Liverpool Bay	2	3	1	7	6	10	9	8	12	1	16	7	20	1	23	0	25	1	26	4	27	1	27	1	26	4	27	1	27		
19	George's Pier	1	102	6	4	5	7	5	11	6	15	7	19	7	23	8	25	3	27	1	28	5	29	0	28	0	29	0	29	0		
	Liverpool Bay	1	92	6	4	5	7	5	11	6	15	7	19	7	23	8	25	3	27	1	28	5	29	0	28	0	29	0	29	0		
20	George's Pier	1	4	10	3	9	7	0	11	3	15	9	29	0	33	1	25	9	27	10	29	3	30	0	29	3	30	0	29	3		
	Liverpool Bay	1	3	4	5	6	8	9	12	5	16	9	30	1	34	0	26	6	28	10	30	3	31	0	30	3	31	0	30	3		
21	George's Pier	1	1	1	3	3	6	9	11	1	16	0	20	3	23	6	26	5	28	5	30	1	31	0	30	1	31	0	30	1		
	Liverpool Bay	1	1	1	3	3	6	9	11	1	16	0	20	3	23	6	26	5	28	5	30	1	31	0	30	1	31	0	30	1		
22	George's Pier	0	30	9	2	9	6	5	11	0	16	2	20	6	23	10	26	11	29	3	31	1	32	0	31	1	32	0	31	1		
	Liverpool Bay	0	1	0	2	4	9	7	11	1	9	16	10	21	4	24	6	29	6	30	1	31	1	32	0	31	1	32	0	31		

N.B.—The Rise and Fall of Tide here given for Liverpool Bay refers to the outer bay in the Fairway to the several channels.

TABLE III.

TABLE SHOWING THE AVERAGE OF THE TIME, AND THE HEIGHT, OF HIGH AND LOW WATER OVER THE LOW WATER OF ORDINARY SPRING TIDES AT LIVERPOOL, CORRESPONDING TO EACH HOUR OF THE MOON'S TRANSIT OVER THE MERIDIAN.

Hour of Moon's transit over the meridian. (Nautical Almanack Page IV.)	HIGH WATER.		LOW WATER.	
	Average time of high water at Liverpool, coin- ciding with the turn of the stream in St. George Chan- nel, being the commencement of the southerly stream.*	Level of high water at Liverpool above low water ordinary springs.	Average time of low water at Liverpool, coin- ciding with the turn of the stream in St. George Chan- nel, being the commencement of the northerly stream.*	Level of low water at Liverpool above low water of ordinary spring tides.
Hours.	h. m.	ft. in.	h. m.	ft. in.
Between 12 & 1	11 55	27 9	6 27	2 1
" 1 " 2	0 38	27 11	7 12	1 7
" 2 " 3	1 20	27 3	7 55	1 11
" 3 " 4	2 4	26 7	8 33	3 1
" 4 " 5	2 59	25 0	9 24	4 3
" 5 " 6	3 54	23 8	10 10	5 8
" 6 " 7	5 8	22 2	11 18	7 3
" 7 " 8	6 53	21 11	0 54	7 4
" 8 " 9	8 17	22 11	2 27	6 9
" 9 " 10	9 28	24 2	3 49	5 3
" 10 " 11	10 22	25 11	4 44	3 6
" 11 " 12	11 9	27 2	5 37	2 4

\* The time of turn of stream in the Northern Channel is the same, but its direction the converse of that in St. George Channel.

TABLE IV.

SHOWING the TIMES of HIGH WATER, FULL and CHANGE, with the RISE at SPRINGS and NEAPS above the mean LOW-WATER level of ordinary Spring Tides.

Name of Place.	High Water, Full and Change.		Rise.	
	Local Time.	Greenwich Time.	Springs.	Neaps.
ENGLAND.				
	h. m.	h. m.	ft.	ft.
Smalls lighthouse - - - -	6 - 0	6 23	21	
Ramsey sound - - - - -	6 - 0	6 21	17	
Fishguard - - - - -	6 - 56	6 16	12½	9½*
Newport - - - - -	7 0	7 20	12	9
Cardigan - - - - -	7 1	7 20	12	9
New Quay - - - - -	7 30	7 47	15	
Aberystwith - - - - -	7 31	7 47	18½	10
Aberdovey - - - - -	8 - 0	8 16	15	
Sarn-y-Bwch reef - - - -	7 - 40	7 56	14	
Barmouth - - - - -	7 - 41	7 57	17	13½
Sarn Badrig - - - - -	7 30	7 47	18	
Port Madoc - - - - -	7 - 30	7 46	17	
St. Tudwall road - - - -	7 - 45	8 3	14	9½
Pwllheli bar - - - - -	7 - 46	8 4	13½	9½
Bardsey island - - - - -	7 40	7 59	15	
Porth Dynlleyn - - - - -	8 30	8 58	16	
Carnarvon - - - - -	9 27	9 44	15½	12
Holyhead - - - - -	10 11	10 29	16	12½
Amlwch - - - - -	10 30	10 47	18?	13?†
Beaumaris - - - - -	10 28	10 44	22½	15½
Air point, river Dee - - -	10 54	11 7	25	19
Chester (Crane wharf) - -	0 16	0 28	10	
Liverpool - - - - -	11 23	11 35	27½	20½
Formby point - - - - -	10 35	10 47	24	19
Ribble lighthouse - - - -	10 51	11 3	24	17
Preston - - - - -	11 49	11 50	10	4½
Fleetwood (Wyre Lt.) - -	11 11	11 23	27½	20½
" port - - - - -	11 12	11 24	27	20½
Glasson dock - - - - -	11 16	11 27	20	14
Lancaster - - - - -	11 16	11 27	8½	2
Poulton-le-sands - - - -	11 26	11 38	27½	21½
Piel harbour - - - - -	11 5	11 17	28	21
Whitehaven - - - - -	11 14	11 28	26	19
Port Harrington - - - -	11 15	11 29	25	19
Workington - - - - -	11 4	11 18	25½	20
Maryport - - - - -	11 26	11 40	25	19
Silloth - - - - -	11 40	11 54	26	20

\* The rise of tide given for those ports which are generally dry at low water is that above the ground, or the depth which the harbour affords at the time specified.

† A query, thus ?, indicates that the height against which it is placed is an approximation.



Table IV,—*continued*.

Name of Place.	High Water, Full and Change.		Rise.	
	Local Time.	Greenwich Time.	Springs.	Neaps.
SCOTLAND.				
	h. m.	h. m.	ft.	ft.
Annan foot - - - - -	0 5	0 18	28½	29
Dumfries - - - - -	12 0	0 14	6	
Southernness - - - - -	11 50	0 4	27½	19½
Abbey head - - - - -	11 10	11 26	25	18½
Kirkcudbright - - - - -	11 10	11 26	23	14
			At pier.	
Newton Stewart (Carty quay) - - - - -	12 0	0 18	12	6
Wigton (pier) - - - - -	11 30	11 48		
			At pier.	
Garliestown - - - - -	11 20	11 38	17	12
Port William - - - - -	11 10	11 28	18	10
Mull of Galloway - - - - -	11 15	11 35	15?	12?*
ISLE OF MAN.				
Point of Ayre - - - - -	11 7	11 24	20?	16?
Douglas - - - - -	11 12	11 30	20½	16
Ramsey - - - - -	11 12	11 29	20½	16
Peel - - - - -	11 8	11 27	18½	14½
Calf sound - - - - -	11 17	11 36	16½	12½
Port St. Mary - - - - -	11 10	11 29	22	18
Castletown - - - - -	11 10	11 29	20	16

\* A query, thus ?, indicates that the height against which it is placed is an approximation.

TABLE V.

TABLE of WET DOCKS, TIDAL BASINS, &c., with their AREA, DIMENSIONS, and WHARFAGE, in the PORTS of ST. GEORGE, or IRISH, CHANNEL, &c.

Name of Port.	Description.	Year Opened.	Acreage.	Length.	Breadth.	Entrance.			Length of Wharfage, &c.
						Breadth.	Depth over Sill.		
							Springs.	Neaps.	
ENGLAND AND WALES.									
Amlwch	Tidal dock	-	a. r. p.	ft.	ft.	ft. in.	ft. in.	ft. in.	feet.
			- - -	681	127	40 0	- -	- -	Entrance defended in stormy weather by timber booms.
Mostyn, R. Dee	Tidal basin	-	6 2 0	-	-	250 0	-	-	
Chester	Shropshire Canal lock.	-	- - -	81	-	14 9	-	-	
Liverpool*	First dock	1720	- - -	-	-	-	-	-	The first or old dock was $3\frac{1}{2}$ acres.
Alexandra dock	S. entrance E.	-	a. yds. 17 4,055	-	-	60 0	30 9†	23 6†	
Do. do.	Do. W.	-	- - -	-	-	60 0	30 9	23 6	
Do. Branch dock No. 3.	-	-	7 3,420	-	-	-	-	-	
Do. Branch dock No. 2.	-	-	9 2,657	-	-	-	-	-	
Do. Branch dock No. 1.	-	-	9 573	-	-	-	-	-	
Langton dock	S. entrance	-	18 589	-	-	50 0	27 9	20 6	
Do. lock (238 ft.)	W. do.	-	0 1,719	-	-	65 0	30 9	23 6	
Do. do. (119 ft.)	E. do.	-	0 860	-	-	65 0	30 9	23 6	
Do. Branch dock	W. do.	-	2 4,549	-	-	60 0	30 9	23 6	
Brocklebank dock	W. do.	-	11 1,010	-	-	60 0	26 6	19 3	
Do. do.	S. do.	-	- - -	-	-	80 0	26 6	19 3	
Do. lock (110 ft.)	N. do. W.	-	- - -	-	-	32 0	24 9	17 6	
	S. do. W.	-	- - -	-	-	20 0	24 9	17 6	
North Carriers dock	W. passage	-	2 3,423	-	-	40 0	24 9	17 6	
South do.	Do.	-	1 4,515	-	-	40 0	24 9	17 6	
Canada dock	S. passage E.	1860	17 4,043	-	-	50 0	25 3	18 0	
Do. do.	Do. W.	-	- - -	-	-	80 0	25 3	18 0	
Canada lock (498 ft.)	-	-	1 3,479	-	-	100 0	26 6	19 3	
Huskisson dock	-	-	14 3,451	-	-	-	-	-	
Do. Branch dock No. 2.	-	-	8 780	-	-	-	-	-	
Do. Branch dock No. 1.	-	-	7 592	-	-	-	-	-	
Do. E. lock (338 feet).	-	-	0 4,682	-	-	80 0	25 3	18 0	
Do. W. lock	-	-	0 3,650	-	-	45 0	24 9	17 6	
Sandon dock	W. entrance	-	10 100	-	-	70 0	25 3	18 0	
Wellington Half-tide dock.	E. do.	-	3 813	-	-	70 0	25 6	18 3	
Do. do.	W. do.	-	- - -	-	-	50 0	25 3	18 0	
Wellington dock	W. passage	-	7 4,120	-	-	70 0	25 3	18 0	
Bramley Moore dock	N. do.	-	9 3,106	-	-	60 0	24 9	17 6	
Do. do.	S. do.	-	- - -	-	-	60 0	24 9	17 6	
Nelson dock	Do.	-	7 4,786	-	-	60 0	25 3	18 0	
Canal basin	Passage	-	0 920	-	-	18 0	19 0	11 9	
Stanley lock	W. do.	-	- - -	-	-	18 0	16 6	9 3	
Collingwood lock	Do.	-	- - -	-	-	18 0	16 6	9 3	
Salisbury lock	Do.	-	- - -	-	-	18 0	-	-	
Do. Inner sill.	-	-	- - -	-	-	-	16 6	9 3	
Do. Outer "	-	-	- - -	-	-	-	24 0	16 9	
Stanley dock	W. passage	-	7 120	-	-	51 0	24 8	17 5	
Collingwood dock	Do.	-	5 240	-	-	60 0	25 6	18 3	
Salisbury dock	W. entrance N.	-	3 2,146	-	-	60 0	25 8	18 5	
Do. do.	Do. S.	-	- - -	-	-	50 0	25 8	18 5	
Clarence graving dock basin.	N. passage	-	1 1,056	-	-	45 0	23 6	16 3	
	S. do.	-	- - -	-	-	44 6	23 3	16 0	
Clarence Half-tide dock.	W. entrance	-	4 1,791	-	-	50 0	23 9	16 6	

\* Corrected to January 1882, from Mersey Docks and Harbour Board.

† These depths are adapted to the Admiralty tide tables; the low-water datum of an ordinary spring tide being  $8\frac{1}{2}$  feet below the Old Dock sill of Liverpool.

Table V.—continued.

Name of Port,	Description.	Year Opened.	Acreage.	Length.	Breadth.	Entrance.			Length of Wharfage, &c.
						Breadth.	Depth over Sill.		
							Springs.	Neaps.	
			a. yds.	ft.	ft.	ft. in.	ft. in.	ft. in.	feet.
Clarence dock	W. passage	-	6 273	-	-	47 0	21 11	14 8	
Trafalgar lock	N. & S. do.	-	0 2,937	-	-	45 0	25 4	18 1	
Do. dock	N. do.	-	5 4,546	-	-	44 3	25 4	18 1	
Victoria dock	N. do.	-	5 3,559	-	-	45 0	23 8	16 5	
Do. do.	S. do.	-	-	-	-	50 0	25 3	18 0	
Corn Warehouse dock	Do.	-	2 3,375	-	-	60 0	26 9	19 6	
Waterloo dock	Do.	-	3 2,146	-	-	60 0	26 9	19 6	
Half-tide dock	W. entrance N.	-	4 3,250	-	-	65 0	26 9	19 6	
Lock (110 ft.)	Do. middle	-	-	-	-	32 0	26 9	19 6	
Do. do.	Do. S.	-	-	-	-	65 0	26 9	19 6	
Prince's dock	N. passage	1821	11 1,490	-	-	45 0	24 8	17 5	
George's dock	N. entrance	1771	5 154	-	-	36 0	23 3	16 0	
Do. do.	S. passage	-	0 2,439	-	-	40 3	-	-	
Manchester dock	W. entrance	-	1 595	-	-	32 10	18 6	11 3	
Do. lock (66 ft.)	Do.	-	0 315	-	-	33 8	22 6	15 3	
Canning dock	W. passage	-	4 376	-	-	45 0	24 10	17 7	
Do. Half-tide dock	Two W. entrances each	-	2 2,698	-	-	45 0	25 0	17 9	
Albert dock	N. passage	1846	7 3,542	-	-	45 0	23 1	17 10	
Do. do.	E. do.	-	-	-	-	45 0	24 9	17 6	
Salthouse Dock	N. do.	1753	6 3,019	-	-	45 0	24 9	17 6	
Wapping basin	W. do.	-	1 3,151	-	-	40 0	24 9	17 6	
Do. do.	N. do.	-	-	-	-	50 0	24 8	17 2	
Do. do.	S. do.	-	-	-	-	50 0	24 9	17 6	
Wapping dock	W. do.	-	5 499	-	-	50 0	24 9	17 6	
Do. do.	S. do.	-	-	-	-	50 0	24 9	17 6	
King's dock	Do.	1788	7 3,896	-	-	42 0	23 9	16 6	
Queen's Half-tide dock	W. entrance N.	-	3 3,542	-	-	70 0	25 6	18 3	
Do. do.	Do. S.	-	-	-	-	50 0	25 6	18 3	
River Craft dock and lock.	{ Outer	-	0 4,102	-	-	30 0	18 6	11 3	
	{ Inner	-	-	-	-	30 0	17 6	10 3	
Queen's dock	W. passage	1796	10 1,564	-	-	50 0	24 9	17 6	
Do. do.	S. do.	-	-	-	-	60 0	25 3	18 0	
Coburg dock	W. entrance	-	8 28	-	-	70 0	24 9	17 6	
Canal dock	Do.	-	0 4,635	-	-	25 0	19 9	12 6	
Brunswick dock	N. passage	-	12 3,010	-	-	60 0	25 3	18 0	
Do. Half-tide do.	E. do.	-	-	-	-	42 0	24 3	17 0	
Do. do.	W. entrance	-	1 3,388	-	-	45 0	24 9	17 6	
Toxteth dock	Do.	-	1 499	-	-	40 0	23 9	16 6	
Harrington dock	Do.	-	0 3,740	-	-	29 9	23 11	16 8	
Herculeum Half-tide do.*	W. entrance N.	1867	3 3,000	-	-	80 0	26 9	19 6	
Do. do.	Do. S.	-	-	-	-	60 0	26 9	19 6	
Do. Branch dock.	-	-	2 853	-	-	-	-	-	
Canada	Basin	-	6 4,528	-	-	250 0	-	-	
Sandon	Do.	-	6 904	-	-	200 0	-	-	
George's Ferry	Do.	-	0 1,344	-	-	67 0	-	-	
Chester	Do.	-	0 2,568	-	-	38 0	-	-	
Anderton	Do.	-	0 1,422	-	-	46 0	-	-	
Eagle	Do.	-	0 3,971	-	-	50 0	-	-	
South Ferry	Do.	-	0 2,927	-	-	60 0	-	-	
Total Water area of Liverpool Basins		-	18 1,441						
Do. do. Docks		-	324 1,992						
Birkenhead docks:									
Western float	-	-	52 319	-	-	-	-	-	
Eastern do.	-	-	56 3,796	-	-	-	-	-	
Duke Street passage	-	-	-	-	-	100 0	26 3	19 0	
Basin, near Canada works.	West	-	1 2,554	-	-	50 0	-	-	
Do. do.	East	-	1 84	-	-	50 0	-	-	
Corn Warehouse dock	-	-	1 453	-	-	30 0	18 9	11 6	
Railway Company's basin.	-	-	0 606	-	-	-	-	-	
Wallasey dock	-	-	12 3,813	-	-	-	-	-	
Do. do.	Passage	-	0 1,333	-	-	50 0	27 9	20 6	
<div>Landing Stages. Prince's, 1,002 feet long, 4 bridges: 80 feet broad. George's, 506 feet long, 2 bridges: 80 feet broad. Total lineal quayage, 23 m. 612 yds.</div>									

*Landing Stages.*  
 Prince's, 1,002 feet long, 4 bridges; 80 feet broad.  
 George's, 506 feet long, 2 bridges; 80 feet broad.  
 Total lineal quayage, 23 m. 612 yds.

\* Closed. When re-opened, will have an increased depth of 4 feet over the sills.

Table V.—continued.

Name of Port.	Description.	Year Opened.	Acreage.	Length.	Breadth.	Entrance.			Length of Wharfage, &c.
						Breadth.	Depth over Sill.		
							Springs.	Neaps.	
			a. yds.	ft.	ft.	ft. in.	ft. in.	ft. in.	feet.
Inner Northern entrances.	North	-	-	-	-	100 0	27 9	20 6	
Lock of 198 feet	Middle	-	0 667	-	-	30 0	-	-	
Do.	Inner sill	-	-	-	-	-	27 9	20 6	
Do.	Outer do.	-	-	-	-	-	30 9	23 6	
Lock 274 feet	South	-	0 1,522	-	-	50 0	-	-	
Do.	Inner sill	-	-	-	-	-	27 9	20 6	
Do.	Outer do.	-	-	-	-	-	30 9	23 6	
Egerton dock	W. passage	-	3 4,011	-	-	70 0	26 1	18 10	
Morpeth dock	Do.	1868	11 2,404	-	-	70 0	24 2	16 11	Birkenhead landing stages adapted for low water.
Do. Branch dock	Do.	-	4 243	-	-	85 0	30 9	23 6	
Do. lock (398 ft.)	River do.	-	0 3,777	-	-	85 0	30 9	23 6	Basin stage 1,040 ft. long, 50 and 3 feet broad.
Alfred dock	-	1867	8 2,922	-	-	-	-	-	
Outer Northern entrances.	-	-	-	-	-	-	-	-	
Alfred dock	S. lock (398 ft.)	-	0 2,222	-	-	50 0	30 9	23 6	Woodside 800 ft. long, 80 ft. broad.
Do.	Md. do. (198 ft.)	-	0 667	-	-	30 0	30 9	23 6	
Do.	N. do. (348 ft.)	-	0 3,888	-	-	100 0	30 9	23 6	
Railway Companies' basin.	S. passage	-	0 3,144	-	-	25 0	18 9	11 6	
North basin	-	-	4 2,843	-	-	500 0	-	-	
Total Water area of Birkenhead Docks and Basins.	-	-	164 2,538	-	-	-	-	-	Total lineal quayage:
Total Water area of Liverpool Docks and Basins.	-	-	342 3,433	-	-	-	-	-	m. yds.
Total Water area of Liverpool and Birkenhead Docks and Basins.	-	-	507 1,131	-	-	-	-	-	Birkenhead 9 779 Liverpool 23 613
									Total - 32 1,391
Garston, R. Mersey	Wet dock	-	6 1,200	1,000	270	50 0	25 0	17 9	Adapted for vessels up to 1,000 tons. Entered by reverse gates.
Do. do.	Do.	1875	8 1,294	1,000	370	55 0	27 0	19 9	
Ellesmere port	Do.	-	2 2,400	437	188 { 134	-	-	-	
Do. do.	Do.	-	1 0	191	132	33 0	23 6	16 6	
Do. do.	Sea lock	-	-	103	32	32 0	"	"	
Do. do.	Do.	-	-	74	144	-	-	-	
Weston point	Wet dock	-	2 0	-	-	50 0	19 0	12 0	Dock entered by gates.
Do.	Do.	-	1 0	-	-	-	-	-	
Do.	Do.	-	1 0	-	-	-	-	-	
Runcorn	10 docks	-	-	-	-	-	-	-	
		en-ld.							
Bridgewater docks	Tidal basin	1860	1 2,337	380	170	50 0	18 10	12 1*	
Alfred dock	-	-	1 3,826	600	130	50 0	18 10	12 1	
Old dock	-	-	0 3,466	390	80	21 6	18 10	12 1	
Middle basin	-	-	0 3,603	146 { 480	80 { 44	21 6	-	-	
Old basin	-	-	2 153	390	65 to 90	21 6	-	-	
Francis dock	-	1860	2 706	1,580	57 to 70	21 6	-	-	
New dock	-	1869	2 1,708	600 { 50	150 { 130	40 0	-	-	
Old Quay docks	Tidal dock	-	0 3,290	210	141	32 0	15 10	9 1	
Do. do.	Inside dock	-	0 4,730	330	129	32 0	"	"	
Do. do.	Large basin	-	1 1,280	510	108	32 0	"	"	
Widnes	Dock	-	1 1,610	264	210	22 0	12 0	"	
Do.	Sea lock	-	-	80	-	22 0	12 0†	-	
Lytham, R. Ribble	Tidal dock	-	-	500	120	-	20 0	13 0	

\* Same depth over sill as shown in Holden's tables.  
† 11 ft. 6 in. on sill with a 10 feet tide.

Table V.—continued.

Name of Port.	Description.	Year Opened.	Acreage.	Length.	Breadth.	Entrance.			Length of Wharfage, &c.
						Breadth.	Depth over Sill.		
							Springs.	Neaps.	
Fleetwood, R. Wyre	Wet dock	1877	a. yds.	ft.	ft.	ft. in.	ft. in.	ft. in.	feet.
Do.	Timber dock	-	10 0	1,000	400	50 0	23 3	16 0	
Glasson dock, R. Lune	Wet dock	-	15 0	500	200	35 0	20 0	14 0	
Ulverston	Canal	-	- - -	6,600	70	- -	12 0	-	
Do.	Entrance lock	-	- - -	108	-	27 0	16 0	7 0	
									The Furness railway crosses the canal a little below the town, cutting off communication except by vessels with lowered masts.
Do.	Town basin	-	- - -	252	162	-	-	-	
Barrow	Wet docks	1867	- - -	-	-	-	-	-	
Do.	Entrance lock	-	a. r. p.	-	-	60 0	25 6	18 0	6,000 feet of quay space.
Devonshire dock	Wet dock	-	1 2 0	-	-	80 0	18 to 20 ft.	-	
Buccleugh dock	Do.	-	30 0 0	2,500	ave. } 250	-	-	-	
Ramsden dock	Do.	-	31 0 0	3,000	-	100 0	31 6	24 0	
Do.	Entrance basin	-	65 0 0	900	-	-	-	-	
Cavendish dock	Timber dock	-	8 0 0	-	-	80 0	-	-	Entered from Ramsden dock.
			142 0 0	-	-	-	-	-	
Whitehaven	Wet dock	-	4 3 0	-	-	50 0	18 0	11 0	
Workington.	Do.	-	4 2 0	600	300	40 0	16 0	10 3	
Lonsdale dock	Do.	-	3 2 0	-	-	50 0	18 0	12 0	
Maryport, Elizabeth dock.	Do.	1857	- - -	-	-	-	-	-	
Do. do.	Entrance basin	-	2 2 0	-	-	-	-	-	
Do. do.	Wet dock	-	6 0 0	850	300	50 0	23 0	17 0	In course of construction (1884).
Do. do.	Entrance basin	-	4 2 0	-	-	-	-	-	
Port Silloth, Solway	Tidal dock	1859	4 0 0	600	300	100 0	21 6	15 6	
Do. do.	Wet dock	-	6 0 0	-	-	-	-	-	Do. do.



Table VI.—*continued.*

Name of Port.	Description.	Graving Docks.				Patent Slips.			Gridirons.		
		No.	Length over sill.	Breadth of Entrance.	Depth over Sill at High Water.	For Tons.	Depth over Cradle.		Length.	Depth over at High Water.	
							Sps.	Nps.		Sps.	Nps.
Clarence Dock	Gridiron	—	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.
King's Pier	Do.	—	—	—	—	—	—	—	313 6	20 6	13 6
Birkenhead	Graving dock	3	—	—	—	—	—	—	509 0	18 7	11 7
Western Float	Do.	—	930 0	60 0	22 9	15 6	—	—	—	—	—
No. 1.	Do.	—	750 0	50 0	26 6	19 3	—	—	—	—	—
Western Float	Do.	—	750 0	85 0	26 6	19 3	—	—	—	—	—
No. 2.	Do.	—	—	—	—	—	—	—	—	—	—
Western Float	Do.	—	—	—	—	—	—	—	—	—	—
No. 3.	Do.	—	—	—	—	—	—	—	—	—	—
Garston	Gridiron	—	—	—	—	—	—	—	300 0	—	—
Ellesmere Port,	Patent slip	—	—	—	—	300	—	—	—	—	—
Mersey.	Do.	—	—	—	—	—	—	—	—	—	—
Runcorn, Mersey	Gridiron	—	—	—	—	—	—	—	150 0	—	—
Bridgewater	Do.	—	—	—	—	—	—	—	—	—	—
Docks.	Do.	—	—	—	—	—	—	—	—	—	—
Widnes, Mersey	Patent slip	—	—	—	—	150	—	—	—	—	—
Freckleton, Ribble	Do.	—	—	—	—	150	7 0	—	—	—	—
Preston	Do.	—	—	—	—	260	8 6	—	—	—	—
Do.	Gridiron	—	—	—	—	—	—	—	120 0	8 6	—
Fleetwood on	Do.	—	—	—	—	—	—	—	260 0	13 0	—
Wyre.	Do.	—	—	—	—	—	—	—	—	—	—
Glasson Dock,	Graving dock	—	197 0	35 0	—	—	—	—	—	—	—
E. Lune.	Do.	—	—	—	—	—	—	—	—	—	—
Ulverston	Patent slip	—	—	—	—	75	4 6	—	—	—	—
Barrow	Do.	—	—	—	—	600	8 0	—	—	—	—
Do.	Graving dock	—	500	60	22½	—	—	—	—	—	—
Do.	Depositing dock.	—	—	—	—	—	—	—	—	—	—
Whitehaven	Patent slip	—	—	—	—	300	8 0	—	—	—	—
Do.	Gridiron	—	—	—	—	—	—	—	150 0	11 0	—
Workington	Patent slip	—	—	—	—	350	6 9	—	—	—	—
Do.	Gridiron	—	—	—	—	—	—	—	—	10 0	—
Maryport	Patent slip	—	—	—	—	500	8 6	—	—	—	—
Do.	Gridiron	—	—	—	—	—	—	—	200	11 0	—
<i>Isle of Man.</i>											
Ramsey	Patent slip	—	—	—	—	300	—	—	—	—	—

To lift vessels of 3,400 tons weight.

Extracts from a notice issued by the Mersey Docks and Harbour Board,  
23rd January 1875 :—

“In accordance with the Act of Parliament 37 and 38 Vict., cap. 52, it is required that, after the 1st November 1874, steamships and vessels in tow, when navigating in the sea channels or approaches to the river Mersey, between Rock lighthouse and the furthest point seawards to which such channels are buoyed on both sides, shall, whenever it is safe and practicable, keep to that side of the channel which lies on the starboard side of such steamships, &c.”

“A steam-vessel inward bound, on passing north of the Bar lightship, and steering direct for Formby lightship, will fall in on her starboard bow, with the *red* bar buoy ; and if Crosby light-ship is seen, the danger of approaching the shoal of Little Burbo will be guarded against by taking care not to open Crosby light-ship south of Formby light-ship until after passing Q. 2 *red* can buoy with perch. Outward bound steamships, after passing Formby light-ship and clearing the N.W. Spit of Jordan flats (marked by the buoy Q. 3 *black* nun to be left on the starboard hand) may keep away to the N.W., leaving Q. 2 and 1 *black* nun buoys also on the starboard hand ; thus passing into deep water over the bar and clear of the inward track.”

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RULES concerning the LIGHTS or SIGNALS to be carried, and concerning the STEPS for avoiding COLLISION to be taken, by VESSELS navigating the RIVER MERSEY.

1. Every vessel exceeding 10 tons measurement, including river craft, while navigating, or anchored, or moored in any part of the river Mersey, shall, from and after the 1st day of February, 1881, observe and obey the new "Regulations for Preventing Collisions at Sea," as set out in the first schedule annexed to an Order in Council made in pursuance of the Merchant Shipping Act Amendment Act, 1862, and dated the 14th day of August, 1879, and as varied and amended by an Order in Council made as aforesaid, and dated the 24th day of March, 1880, with the exceptions and additions mentioned in the following rules.

2. Canal flats and all other vessels without masts, whilst being towed, shall carry the lights prescribed for sailing vessels by Article 6 of the said "Regulations for Preventing Collisions at Sea."

3. In addition to the lights for a steam vessel towing another vessel, prescribed by Article 4 of the said Regulations, such steam vessel shall carry a bright white light showing astern as a guiding light to the vessel or vessels being towed.

4. Instead of the light prescribed by Article 8 of the said Regulations, every vessel when at anchor in the river Mersey shall carry two white lights in globular lanterns of not less than 8 inches in diameter, and so constructed as to show a clear, uniform, and unbroken light visible all round the horizon for at least one mile, one of which lights shall be placed at a height not exceeding 20 feet above the hull on the forestay, or otherwise near the bow where it may best be seen, and the other at the main or mizen peak, or on the boom topping lift, or other position near the stern, at double the height of the bow light before-mentioned.

5. Instead of the light prescribed by Article 11 of the said Regulations, a bright white light similar to the lights mentioned in Rule 4 shall be shown continuously from the stern rail of every vessel while under way and in motion in all weathers between sunset and sunrise.

6. A vessel anchored to mark the position of a wreck or other obstruction, shall carry, in all weathers from sunset to sunrise, two bright White Lights, similar to those mentioned in Rule 4, which lights shall be placed horizontally on a cross yard on the foremast, at a height not exceeding 20 feet above the hull and 20 feet apart. And the said vessel shall carry, in all weathers, between sunrise and sunset, two black balls placed as herein-before ordered with regard to the lights afore-mentioned.

Dock Office, Liverpool,  
January 20th, 1881.

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EXTRACTS from REGULATIONS established by the SECRETARY OF STATE FOR  
WAR in January 1883, respecting Vessels used for the Storage of  
Gunpowder in the River Mersey.

"A red flag is at all times to be displayed at the masthead of every floating magazine.

"All powder vessels bringing gunpowder are, before entering the Mersey, to hoist a red flag, which is to be kept up until the whole of the powder is discharged, and before approaching the magazines, all fires are to be completely extinguished, and they are not to be re-lighted until the vessel is moved a quarter of a mile off; and the respective owners of each magazine are to be responsible for their respective vessels bringing powder from their works being provided with the red flag, and for its being hoisted at all times when their vessels have powder on board on the Mersey. All vessels coming to receive powder from the magazines are to extinguish their fires and lights before they arrive within a distance of a quarter of a mile from the magazines, and are to keep them extinguished while within that distance.

"No boats but those belonging to the Storekeeper, excepting boats of ships bringing powder, part of ship's stores to be deposited, or the boat conveying the inspecting officer, are to be allowed to go alongside the powder vessel, nor is any boat to be allowed to communicate with any vessel or vessels which are receiving or discharging powder alongside the powder vessel.

"Any vessel used as a magazine for gunpowder must be moored so as to swing inside that portion of the site set apart by the Admiralty in 1851, which is marked by red dotted lines in the Chart, Appendix H., of the Report of the Admiralty Committee in August 1891.

"The distance between each vessel used for the storage of gunpowder shall be such as will afford a reasonable security against communicated explosion, which, in the case of vessels containing 200,000 lbs. of gunpowder, should not be less than 200 yards."

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## Glossary of words common on the coast of Wales.

Welsh.			Spelling adopted.			Signification.
Aber	-	-	Aber	-	-	The mouth of a river.
Afon	-	-	Afon	-	-	A river.
Bach	-	-	Fach	-	-	Little.
Careg	-	-	Carreg	-	-	Rock, a stone.
Clyt	-	-	Clytts	-	-	A patch of rock.
Dau	-	-	Dau	-	-	Two.
Du	-	-	Dù	-	-	Black.
Isaf	-	-	Isaf	-	-	Low or lowest.
Llan	-	-	Llan	-	-	Area, church.
Llech	-	-	Llech	-	-	A flat stone.
Maen	-	-	Maen	-	-	A stone, a rock.
Mawr	-	-	Faur	-	-	Great.
Moel	-	-	Moel	-	-	Bare, conical hill.
Pen	-	-	Pen	-	-	Head, high point.
Pont	-	-	Pont	-	-	A bridge.
Porth	-	-	Porth	-	-	A port, harbour.
Pwll	-	-	Pwll	-	-	A pool.
Sarn	-	-	Sarn	-	-	A causeway.
Traeth	-	-	Traeth	-	-	A sand.
Trai	-	-	Trai	-	-	The ebb shore.
Uchaf	-	-	Uchaf	-	-	Upper.
Ynys	-	-	Ynys	-	-	An island.

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LONDON: Printed by EYRE and SPOTTISWOODE,  
Printers to the Queen's most Excellent Majesty.  
For Her Majesty's Stationery Office.  
[1556.—1200.—4/84.]









